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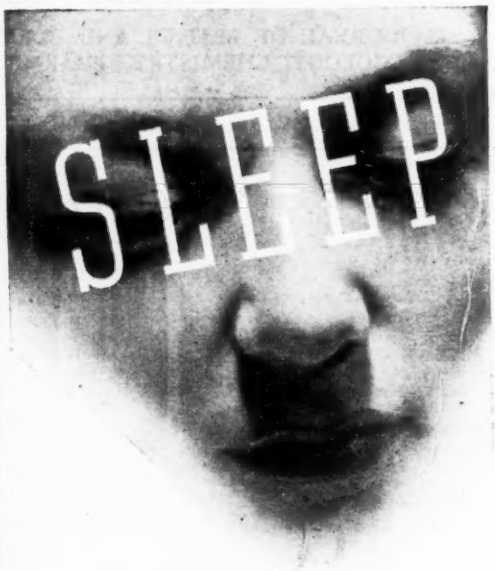

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S166

IMPETIGO CONTAGIOSA
IN THE ARMY, TREATED WITH MICROCRYSTALLINE SULPHATHIAZOLE

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CAPTAIN

THE Official Medical History of the War 1914–18 recorded that the maladies included under the term "impetigo" provided the largest number of cases of skin-disease admitted to medical units. During the present war, although much has been done by hygiene officers and unit medical officers to prevent them, the incidence of impetiginous conditions has been high; therefore, to reduce to a minimum the loss of man-days, those engaged in the cure of skin-disease have tried to accelerate therapy to the greatest degree compatible with the well-being of their patients.

A constant watch has been kept on medical publications for new methods of therapy apparently suitable for military practice. The claim of Harris (1943) that "a single application of a new physical form of the sulfonamides in the treatment of impetigo in my experience with the method thus far has been found to cure the lesions within a day and to stop the spread of the disease," obviously demanded attention. Harris used a 20% suspension of microcrystalline sulphathiazole; and, although his published results appeared to refer entirely to children, his claim was sufficiently strong to merit investigation. Therefore arrangements were made for a clinical trial of the drug in the Army. Owing to the difficulty in obtaining supplies, a 15% suspension in normal saline was used. The investigation was undertaken and reported by Bigger and Hodgson (1944), who found that of 50 cases of impetigo contagiosa treated with microcrystalline sulphathiazole 48 were cured in an average of 5·3 days; of 25 cases treated with local applications of a 15% suspension of the ordinary form of sulphathiazole in normal saline containing 4% tragacanth 23 were cured in an average of 6·5 days. One patient treated with microcrystalline sulphathiazole developed sensitivity to the drug. In their opinion, treatment with the new form of sulphonamide was a definite advance in the therapy of impetigo contagiosa.

Experience has shown that the results obtained by investigators bringing special skill and enthusiasm to a clinical inquiry are not invariably obtained by all clinicians when the new technique is made generally available. Therefore it was necessary to discover if the results claimed by Bigger and Hodgson could be obtained in most military hospitals in the UK to a sufficient extent to justify the use of microcrystalline sulphathiazole as a standard army treatment for impetigo. To obtain this information a large-scale trial had to be carried out critically with full controls, and the standards of diagnosis, assessment, and cure had to be as uniform as possible. After consultation it was agreed that the problem might properly be assessed by statistical methods.

The dermatologists who coöperated in the investigation were instructed that the cases chosen for the inquiry were to be uncomplicated examples of impetigo contagiosa. Cases of eczema or dermatitis secondarily impetiginised and patients who had become sensitised to sulphonamides before admission to hospital were to be excluded. Briefly it was the effect of microcrystalline sulphathiazole on the impetigo contagiosa of Tilbury Fox (1864) which was to be assessed.

The first point to be noted was that, despite the relatively large number of cases of eruptions of the face labelled impetigo which were referred to the hospitals concerned, true examples of impetigo contagiosa of the type required were not very common. The report suggests that the ratio of classical impetigo of Tilbury Fox to other forms of septic eruptions of the face is approximately 1 to 2 (1270 to 2400); but this is a little misleading, as the 2400 possible cases of impetigo were to some extent selected before reference to hospital, and the ratio between classical impetigo contagiosa and other impetiginous eruptions is probably much lower.

In the 1914–18 war impetigo was divided into four classes: impetigo contagiosa, ecthyma, impetigo secondary to scabies, and infected seborrhœic eczema. This differentiation holds good today but cannot be accepted without qualification for the impetiginous eruptions affecting the face, with which we are at present concerned. All the dermatologists complained that true impetigo was rarer than was supposed, that there was difficulty in getting cases suitable for the trial, and that the investigation would have to continue for a longer period than had originally been anticipated if a significant number of cases was to be obtained. In these complaints lies a clue to the reports received from other sources on many other occasions that many cases of so-called impetigo were not cured either with sulphonamides or with penicillin.

Objections were raised against lotio cupro-zincica as the standard control, but it was chosen because it was well known and often used both in military and in civilian practice, and an estimate of its efficiency would be useful.

METHODS OF INVESTIGATION

The investigation was made in the UK January–November, 1944. Sixteen military hospitals were asked to select for the experiment their next 150 consecutive uncomplicated cases of impetigo contagiosa. Each hospital allotted 50 of its chosen cases to each of the three treatments described below, the allocation being serial—i.e., case 1 to treatment A, 2 to B, 3 to C, 4 to A, and so on. The treatments were as follows:

A. Microcrystalline sulphathiazole in 15% suspension.
B. Ordinary sulphathiazole in 15% suspension.
C. Lotio cupro-zincica.

The following instructions were issued:

Treatment "A," with microcrystalline sulphathiazole.—The patient's face and neck are cleansed, his beard shaved or clipped, and the crusts removed from the lesions. On the first occasion the suspension is applied all over the area—e.g., face—to prevent further lesions on untreated areas. On subsequent occasions the crusted areas only are treated, care being taken that the powder-crust formed on the lesions is not removed. The treatment is given twice daily. When the patient is judged sufficiently recovered, zinc cream or Lassar's paste may be applied to save a day or so of the period of treatment. To lessen the risk of sensitisation, microcrystalline sulphathiazole should not be applied to any lesion for longer than ten days.

Treatment "B," with ordinary sulphathiazole.—After preparing the area as described for treatment A, apply a saline suspension of ordinary sulphathiazole 15%, tragacanth 4%, and normal saline to 100%. Treatment should be given twice daily, and should approximate as closely as possible to the routine described for treatment A.

Treatment "C," with lotio cupro-zincica.—Prepare the area as for treatment A and treat the lesions (on the first day the whole of the area) with lotio cupro-zincica (copper sulphate gr. 4, zinc sulphate gr. 6, and camphor water to 1 fluid oz.). The lesions should be thoroughly swabbed with the lotion for two minutes four times daily and thereafter are usually best left exposed to the air.

The hospitals were instructed not to give sulphonamides concurrently by the mouth to patients under investigation. Cases were to be regarded as cured when the skin appeared normal or only very slightly erythematous, so that treatment could be discontinued without a relapse occurring. The data were to be recorded on suitable cards and forwarded to us for analysis.

RESULTS

After ten months we received only some 1270 out of a possible 2400 cards from fourteen of the sixteen hospitals. We had to discard 150 cards, for in comparing the treatments we had to rely on the total time spent in hospital, and where a patient had some other disease besides impetigo he could not be included in the analysis.

We had originally intended to use a more elaborate method of statistical analysis, because there were such differences in the consistency of the results that it was evident that the random errors varied not only with the different treatments but also with the different hospitals. Hence it would not be legitimate to pool the data to obtain a single estimate of the random errors for the whole experiment. We had also expected that the longer a patient had had impetigo before admission to hospital, the longer would be his cure. We therefore obtained for each case the approximate number of

TABLE I—DETAILS OF RESULTS

Hospital	1			2			3			4			5			6			7			8		
Treatment	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Successes	18	22	17	13	15	4	15	16	15	9	10	8	12	13	11	28	39	39	34	38	38	27	27	26
Failures	2	..	1	4	2	11	1	2	1	..	..	1	..	2	4	7	8	8	5	3	1	3	3	3
Discarded cases	17	10	22	1	1	..	4	2	4	1	2	1	5	2	1	3	1	3	4	2	2	6	7	8
Total	37	32	40	18	18	15	20	20	20	10	12	10	17	17	16	38	48	50	43	43	41	36	37	37
Aver. days' stay of successful cases	14·4	14·5	13·2	11·5	12·8	13·0	10·6	10·9	10·9	7·2	6·9	7·5	11·75	11·1	13·4	11·4	12·6	11·5	11·9	12·8	15·1	11·3	12·2	14·6

Hospital	9			10			11			12			13			14			Total		
Treatment	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Successes	43	44	40	36	37	28	41	41	42	7	6	6	22	23	21	17	16	17	322	347	312
Failures	1	1	6	14	13	22	..	1	..	..	..	..	..	..	1	1	3	2	38	38	61
Discarded cases	5	5	5	..	..	..	..	..	1	..	1	1	7	4	8	2	..	1	55	37	57
Total	49	50	51	50	50	50	41	42	43	7	7	7	29	27	30	20	19	20	415	422	430
Aver. days' stay of successful cases	9·2	10·9	11·0	11·75	11·3	12·8	15·5	16·0	18·9	7·6	8·7	9·2	7·8	11·4	12·8	7·4	8·9	11·7	11·3	12·2	13·4

Treatment A = microcrystalline sulphathiazole. Treatment B = ordinary sulphathiazole. Treatment C = lotio cupro-zincica.

days of impetiginous infection before admission, to allow statistically for variations in this period. But we found that the average stay in hospital was not much affected by the duration of infection before admission: hence the statistical analysis could be simplified by neglecting this factor.

We finally adopted two methods of comparing the three treatments. First we went through the cards and classified as failures all cases where the dermatologist in charge of the case noted that the patient failed to respond to the treatment, or that it had to be changed, or that the patient relapsed within 7 days (tables I and II).

TABLE II—COMPARISON OF TREATMENTS

Treatment	Failures	Successes	Total	Percentage of failures
Microcrystalline sulphathiazole	38	322	360	11
Ordinary sulphathiazole	38	347	385	10
Lotio cupro-zincica	61	312	373	16
Total	137	981	1118	12

The proportions of failures are not significantly different for the two sulphonamide treatments, but lotio cupro-zincica had a percentage of failures significantly higher than that of the sulphonamides. The clinical interpretation of the apparent inferiority of lotio cupro-zincica on the above test seems, however, far from certain. In part, at least, the proportion of failures as classified by us must reflect the doctor's confidence in the treatment rather than its actual therapeutic efficiency; for the less a doctor trusts a treatment the more readily will he abandon it for one in which he has more faith. Moreover, a third of the failures came from one hospital.

The failures include 19 cases where some degree of actual or suspected sulphonamide sensitisation appears to have developed owing to treatment with sulphathiazole, 7 of them with the microcrystalline and 12 with the ordinary form; but this difference is not statistically significant. As 745 cases were treated with sulphathiazole, the investigation suggests a risk of sensitisation in 2¼% or, allowing for the possible effects of random sampling, from 1% to 4%.

A second and perhaps more satisfactory test was obtained from examination of the mean stay in each hospital of the men successfully treated. The average durations of stay in hospital of successful cases were:

Treated with microcrystalline sulphathiazole	11·3 days
Treated with ordinary sulphathiazole	12·2 ,,
Treated with lotio cupro-zincica	13·4 ,,

In eleven of the fourteen hospitals, treatment with ordinary sulphathiazole led to a longer stay than did microcrystalline, and in twelve of the hospitals treatment with lotio cupro-zincica led to a longer stay than did ordinary sulphathiazole. These differences give an average advantage of 0·84 days (with a standard error of 0·29 days) to treatment with microcrystalline as against ordinary sulphathiazole, and an average advantage of 1·20 days (with a standard error of 0·39 days) to treatment with ordinary sulphathiazole as against lotio cupro-zincica. The chances in favour of these two differences being significant are about 75 to 1 and over 100 to 1 respectively. In other words, after making due allowance for the possible random errors introduced by sampling, the investigation suggests that in successful cases treatment with 15% microcrystalline sulphathiazole leads to a mean stay in hospital up to 1½ days shorter than does treatment with 15% ordinary sulphathiazole; similarly, that ordinary sulphathiazole gives an average stay in hospital from ½ to 2¼ days shorter than does treatment with lotio cupro-zincica in successful cases.

The 2% of patients who became sensitised to microcrystalline sulphathiazole in Bigger and Hodgson's trial agrees well with the 2¼% met in the army trial. A therapy with a sensitisation risk of 2¼% is not ideal for routine practice, and for general purposes the advantages of microcrystalline sulphathiazole in the treatment of impetigo contagiosa in adults are outweighed by disadvantages of difficulties of manufacture, shortage of supply, and other factors, including the introduction of penicillin as an alternative therapy. Nevertheless, for the specialist, Harris's introduction of this new form of sulphonamide to dermatology is of interest particularly as therapy with microcrystalline forms of sulphonamides may have a much wider application to skin-diseases of children than to those of adults.

CONCLUSIONS

Statistical analysis of the results obtained in 1118 uncomplicated cases of impetigo treated in three different ways suggests the following answers to the two questions which the investigation was designed to answer:

Treatment with 15% sulphathiazole administered in either form is significantly better than treatment with lotio cupro-zincica, except for the risk of sensitisation in 2¼% of cases. The length of stay in hospital under treatment with either form of sulphathiazole is appreciably shorter than with lotio cupro-zincica.

As between the two forms of sulphathiazole, the advantage lies with the microcrystalline form, but this advantage, though probably significant, was outweighed in 1944 by scarcity of supply.

The statistical methods were arranged and carried out by Miss M. M. Johnstone, Major B. B. Swann, Capt. E. S. Cooper-Willis, and Sergt. A. J. H. Morrell. A report drafted by Capt. E. S. Cooper-Willis constitutes the main portion of this article.

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"DEAD HAND"
IN USERS OF VIBRATING TOOLS

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THAT the long-continued use of vibrating tools will lead to the onset of the Raynaud phenomenon has been known for many years. The relationship was described by Loriga in Rome in 1911, and the subject was subsequently reviewed at some length by the International Labour Office (1934, 1938). This review is based mainly on the work of Seyring (1930). Since that time only a few accounts are to be found, the more important being those by Lewis (1932), Lewis and Pickering (1933–34), and Hunt (1937).

These earlier cases developed after the use of pneumatic tools, and the cold exhaust air was generally regarded as the cause of the trouble. That this is not the case is shown by the onset of the Raynaud phenomenon following the modern practice of using high-speed electrically driven tools, in which there is no question of a cold exhaust.

We have seen several cases in an engineering works in the north of England. The tool used by the workers is electrically driven and turns at a speed of 2900 r.p.m. To this tool are attached either emery polishing wheels or burr-shaped metal cutters. The worker steadies the tool with the right hand, but the heavy part of the work in guiding and holding the tool hard on the job falls on the left hand. It is this left hand which is the first and usually the only hand to be affected. The work of polishing is not so hard as that of cutting, and the latter work more readily causes the disease. This finding agrees with the earlier accounts, in which it is pointed out that men working in softer or heated metals do not develop the trouble.

The workers are employed on a daily shift of eight hours, and the great majority have been engaged in the work from three to four years. They are a representative section of unskilled labour, their ages being from 21 to 57 years. An inquiry into their former occupations showed that many of them had, without suffering any disability, worked for long periods in occupations—e.g., window-cleaning and hawking greengrocery—which repeatedly exposed them to cold.

CLINICAL DETAILS

The attack of circulatory disturbance known as the Raynaud phenomenon may be induced by various causes and appears to be associated with many and widely different backgrounds. Some writers recognise as many as fifteen varieties of the disease. The type now under consideration does not, however, show any significant deviation from the average.

The number of workers in the factory who have reported vascular disturbances in the hands is 75, out of 300 who use this high-speed tool. We have made a detailed study of 34 of these patients.

The attacks are induced by cold acting either on the hands or on the body generally. It is for this reason that the attack begins when the worker is getting out of bed, washing in cold water, or leaving the house to go to work. While he is at work during the day in a well-heated shop attacks are uncommon, but on his leaving work a severe attack may be experienced.

The trouble begins with a sudden blanching and deadness of one or more fingers; in no case have we seen the thumb affected, and no patient has complained of trouble in the feet. After a very variable interval the white stage gives way to a deep leaden cyanosis. Later the cyanotic area becomes mottled with salmon-coloured patches, which gradually increase and coalesce, leaving the fingers for a time redder than normal.

The length of an attack may vary from a few minutes to several hours; but, if the patient dips his hands in tepid water or brings his body into warmer surroundings, the duration of the attack is considerably reduced. In the more severe and long-standing cases there is a tendency for the white stage to become shorter or to disappear altogether. Aching is complained of both in the white and blue stages, and often complaint is made of unpleasant and sometimes painful tingling in the red recovery stage.

The chief trouble is the loss of sensation and uselessness of the hand during an attack; several of our patients said that the first sign they had of the disease was the unconscious dropping of a newspaper or a pipe, sometimes a tool at work. The uselessness of the hand and the length of an attack cause serious disability. This is even more serious because the condition is likely to persist after the man has given up the work. We have had no opportunity to observe cases long enough to warrant an opinion on this point, but we recently saw a typical attack in one of the workers who had left the job 22 months ago. This persistence is in line with the intractable nature of the disease when it springs from other and more common causes.

There was no evidence that excessive smoking caused any predisposition to the disease; and, unlike the more common varieties, we did not find any evidence in this industrial type of the Raynaud phenomenon that the attacks were induced by emotional disturbances. Hyperidrosis was not evident; in a few cases small beads of sweat were seen during an attack, but this is probably not more than a normal amount of perspiration which does not evaporate from the cold skin.

The hands of 21 patients were radiographed; a normal hand of a person of the same age and sex was exposed at the same time and on the same film as a control. The areas of decalcification described by Brailsford (1944) were not found; it may be that these are seen only in old-standing cases. None of our patients showed calcinosis, ulcers of the pulp, or any sign of acrosclerosis.

The long latent period of the disease is noteworthy. In our cases the earliest onset was after 6 months' work, and the most delayed onset was after 40 months. The average is 27 months. This agrees well with previous findings, the most interesting of which is that of Seyring (1930), who found that of 100 men working with vibrating tools 4 would show vascular trouble in the fingers within two years. During the third year the number rises steeply to 48. Between the fourth and tenth year the number is 55, and after ten years' work no fewer than 61 will be found to have been affected.

Observations were made in 30 cases by immersing the hands in water at 15° C. In all but two slight and doubtful cases the resulting cyanosis was very evident. Its distribution showed some variations which are no doubt due to the way in which the tool is gripped. The ring-finger is the one most consistently and severely affected; it is followed closely by the middle finger, and the index-finger comes next. There is slightly less in the little finger and none in the thumb.

Inquiry was made into the possible relation of age to the onset of the disease. In one age-group, 20–30 years, the delay in onset showed no difference from that of an age-group 45–55 years. The younger workers with presumably healthy arteries succumbed just as soon as the older men.

Some difference was found when the former occupations of the men were taken into account. Those whose former work was of a light indoor type showed onset of the disease after 22 months. Those who had followed outdoor occupations did not on an average develop the disease until after 28 months. It may be that the fingers of the latter were more inured to cold and toughened by hard work.

PROPHYLAXIS

Prophylaxis must consist of such measures as may be taken to damp out the vibrations and prevent them from being transmitted to the hands of the workers. The trouble has a twofold origin: the rate of revolution and the hardness of the metal on which the tool is being used. A blunt tool will make matters worse, and therefore it is most important that the cutters be kept sharp. With soft or heated metal—e.g., hot rivets—and with a speed of under 2000 r.p.m. the risk is probably insignificant. If high speeds must be used on hard metal the solution is not easy.

The use of gloves or of rubber pads on the hands is not satisfactory; the workers say that they interfere with accurate control of the tool, and they fear that the

accidental ripping of a glove may drag their hands into the work. The use of a mechanical device to fix the tool on its work is seldom possible and, if feasible, it is clumsy and of very limited application. An attempt has recently been made to damp out the vibrations by sheathing the tool in a sleeve of gas-mask tubing. This method seems to have possibilities, but new workers using any form of safeguard will need to be observed for 2–3 years before any opinion can be given on the results.

The working of shorter hours has been suggested, but the probable result of this would be merely to postpone the onset of the disease. In view of the long incubation we suggest that workers should not be employed on this type of work for more than nine months.

TREATMENT

Here and there in a series of patients suffering from the Raynaud phenomenon a background may be elicited and treated with advantage; but, speaking generally, the medical treatment of the condition is very unsatisfactory. The most useful advice is to avoid cold to body and hands alike. This is not easy for most workers and is well-nigh impossible for those in outdoor occupations. Nor are the results of preganglionic section of the thoracic sympathetic chain invariably satisfactory; relapse is only too common.

In the most severe case of our series sympathectomy was done, and short notes of this case are as follows:

> Man, aged 44, worked a metal cutter for 12 months, at the end of which he developed trouble in his left hand. He was obliged to give up work in May, 1943. In spite of this the trouble became worse, and when seen in February 1944, he was totally incapacitated by repeated severe attacks. A preganglionic operation was done in February, 1944. The immediate result was excellent, and the hand remained normal and warm until the cold weather of December, 1944, when slight relapse was apparent. When last seen in March, 1945, he was still subject to attacks but said that they were much slighter and shorter than before the operation. He is back at his work as a window-cleaner; and, although the result is clinically far from perfect, he maintains that the operation has been well worth while.

It seems likely from the result in this case that in the industrial type of the disease the operation of sympathectomy may alleviate but cannot promise a certain cure. This is unfortunately the most common result obtained from sympathectomy in other types of the disease.

DISCUSSION

The exact mechanism of the Raynaud phenomenon is unknown. It takes a variety of forms, in most of which the background is complex and obscure. This industrial type is perhaps the simplest variety; the exciting cause is known, and the results are definite and local. It may therefore be that with increasing knowledge of this type a solution applicable to the more complex forms may be forthcoming.

The length of the latent period raises at once the question what is happening during this time. The cause may be regarded as an oft-repeated trauma of low grade, and the outcome would be degeneration with secondary fibrosis, such as is seen in a chronic bursitis. At the outset the inquiry is hampered by the fact that there is little likelihood of getting early specimens for histological examination. Deductions made from the examination of older specimens are rendered invalid by gross secondary changes—e.g., arterial thrombosis and septic infection. The most likely places in which the earlier changes might be seen are the digital nerves, their vasomotor branches, and the arterial wall.

Digital nerves.—Although it is not easy in the toughened skin of these workers to elicit the finer alterations in sensation, our examination has shown no change in the function of the digital nerves even in the older and more severe cases.

Vasomotor branches.—Numerous fine branches leave the digital nerves at intervals to supply the blood-vessels. These contain vasoconstrictor and, possibly, vasodilator fibres. Of the vasodilator fibres little is known; their very existence is denied by some writers. Stimulation of vasoconstrictor fibres is a widely accepted explanation of the Raynaud phenomenon; but, in the case we have described above, total sympathetic denervation of the hand did not prevent the return of the disease, and this unfortunately holds for other types of the affection.

Arterial wall.—It seems clear then that degenerative changes in the arterial wall afford the most likely explanation. In this industrial type it may be that the continued vibrations damage the vasa vasorum; and, if injury were done to these, nutritional and functional changes might be expected in the intima and smooth muscle. The view that the cause lies in damage to the arterial wall is supported by the not infrequent occurrence of the Raynaud phenomenon in the fingers of elderly arteriosclerotic patients. In these cases there can be little doubt that the trouble is due to degenerative changes in the vessel wall.

A further suggestion is that there may be some derangement in the function of the arteriovenous anastomoses. These have been described by several writers; the best account is by Grant and Bland (1931). These short-circuiting paths are designed to play an important part in the regulation of skin temperature to external conditions. They are found in large numbers in the digits and are especially numerous about the finger ends. It is significant that it is just in this area that the Raynaud phenomenon begins.

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SHOULD A BRACHIAL PLEXUS INJURY BE EXPLORED?

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In view of the general opinion still held that injuries of the brachial plexus are not worth operation, the anatomical findings of eight consecutive cases are here reviewed. As the average rate of recovery of damaged peripheral nerves is 1 mm. a day, it will be a long time before the final results can be judged. Two patients (cases 7 and 8), however, have already made excellent recovery within three months. The good result in case 7 was due to the removal of the ligature round the radial (musculospiral) nerve, which had been tightly tied by accident on the field of battle when the axillary artery was ligated. Whether the rapid recovery of case 8 was due to the neurolysis or not will always be controversial.

All the cases described were due to gunshot wounds, which had become severely infected, with dense scarring. Further, six out of eight of these patients also had wounds of the thorax and lungs due to the same missile. This is of importance from the point of view of anæsthesia.

ANÆSTHESIA

Since these operations last from three to five hours the choice of anæsthetic is important. Brachial-plexus block is preferred by some. In the following series a continuous circuit of gas, oxygen, and ether proved very satisfactory. Alternatively, continuous intravenous 'Pentothal' is used.

OPERATIVE PROCEDURE

Learmonth's incision is excellent (fig. 1). This is carried to the posterior border of the sternomastoid muscle and then turns sharply backwards to cross the middle of the clavicle and is continued across the pectoralis major to the anterior fold of the axilla. The lowest portion of the incision should run as far laterally as possible in the anterior axillary border, to minimise chronic infection from perspiration. The pectorales major and minor muscles are divided transversely. A diathermy knife is not essential. In fact, I incise these muscles without it, as muscle retraction controls all

hæmorrhage. The clavicle is divided with a Gigli saw. My assistant, Mr. T. G. Crombie, suggested a dovetail division of the clavicle, to lock the fragments at the end of the operation. This was a great improvement on the transverse division. In any case, the clavicle unites after the third week. As the only pain of the operation is due to the fractured clavicle, dovetailing of the divided ends minimises the pain.

If the lesion of the brachial plexus is supraclavicular, the numerous cervical veins are ligated, and the omo-hyoid muscle is found but not incised. In all lesions the first objective is to isolate the subclavian artery and vein in relation to the scarring, which is usually dense. The three cords of the plexus next provide a good landmark. Gentleness is required in handling the nerves; the "no-touch" technique is essential.

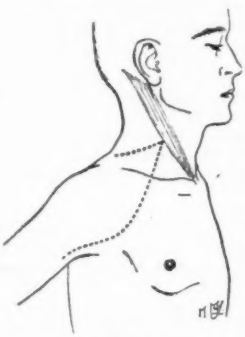

Fig. 1
Learmonth's modified incision.

The proximal neuromata and distal gliomata are excised and the ends brought together by mobilising the lower portions of the nerves. It may be necessary to transplant the ulnar nerve at the elbow and to free the median nerve by incision of the humeral (superficial) head of the pronator teres muscle and the humero-ulnar head of the flexor digitorum sublimis muscle.

There are several methods and materials for nerve suture. I have devised a method (fig. 2) in which one "tension" suture is inserted at least an inch on either side of the nerve junction. The knot thus lies an inch from this junction. Then two sutures (or if possible only one) are inserted at the nerve junction. This method makes least likely the presence of a foreign body at the nerve junction. It must be remembered that catgut is far more irritant than silk or cotton. Further, many sutures destroy many nerve bundles. Mr. T. T. Stamm has suggested the use of 'Nylon.' This will be a great improvement when it is obtainable.

The wound is then closed. The pectorales muscles are repaired with catgut, and the clavicle, which is dovetailed and fits accurately, is held firmly in position by suture of the subclavius muscle and the coraco-clavicular fascia. There is no indication for plating, wiring, or grafting the clavicle.

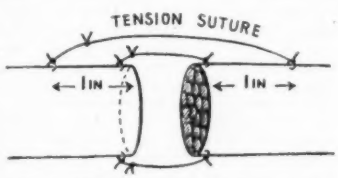

Fig. 2—Writer's method of nerve suture.

Throughout the operation as few bleeding-points as possible are ligated, in view of the length of the operation and to prevent infection, in the presence of which catgut is not absorbed.

The clavicle unites in three weeks. The arm is fixed with 'Elastoplast,' with the elbow in full flexion. If the nerve junction is under any threat of tension, a plaster-back slab is applied to the arm. The question of the time of immobilisation after nerve repair is controversial. Most surgeons suggest three weeks. I prefer from nine to twelve weeks, because a minute stretching of the nerve junction, not demonstrable by X rays, may cause failure of recovery, even after some weeks of immobilisation. Further, the considerable mobilisation of the distal portions of the nerves must partially damage the blood-supply of the nerve.

When there is a complete lesion of the brachial plexus with no evident recovery, amputation is not indicated. The procedure in such cases, which are due either to gunshot wounds or to avulsion, is arthrodesis of all the joints of the upper limb, including the interphalangeal joints. The result is more useful than an artificial limb. Avulsion injuries of the brachial plexus are not benefited by operation on the brachial plexus itself.

AFTER-TREATMENT

After-treatment consists in the application of galvanism, thirty times a minute for three minutes, to each paralysed muscle until full recovery. Passive and active movements are given daily. As all these wounds have been previously infected, a postoperative course of sulphanilamide is indicated. In my opinion, the value of a neurolysis consists in freeing nerves from dense scarring due to infection and permitting fresh but minimal scarring to form, which depends on the prevention of infection after the operation.

OPERATIONS

CASE 1.—Learmonth's incision; clavicle divided. Lateral cord: Neuroma involving about half the cord, explaining the lesion of the musculocutaneous nerve and the transient lesion of the median nerve. Posterior cord: The upper division of the three posterior divisions was undamaged, although there was weakness of the deltoid muscle. The lower two posterior divisions, derived from C7, C8, and T1, had been divided, explaining the complete lesion of the radial (musculospiral) nerve. The cord was divided above and below the lesion, which was left in situ owing to adherence of the neuroma and of scarring to the subclavian vein. The ends were sutured and lay easily in apposition.

CASE 2.—Learmonth's incision; clavicle divided. Lateral cord: Neurolysis performed. Posterior cord: Neurolysis performed; soft small neuromata on upper and middle divisions of the cord were freed but not excised.

CASE 3.—Learmonth's incision: clavicle divided. Hard neuroma on C5 root just above the junction with C6 root. A plexiform enlargement at this junction was probably a glioma. The peripheral division into radial (musculospiral) and musculocutaneous nerves appeared normal. Resection of neuroma in C5 root and below glioma, about two inches being excised. Apposition excellent, when the arm lay at the side.

CASE 4.—Learmonth's incision; clavicle not divided. Medial cord intact. Lateral and posterior cords bound together in scar-tissue. No lesion in nerves, although there was a median and radial (musculospiral) paralysis. Neurolysis performed.

CASE 5.—Incision from lower border of clavicle down to middle of forearm. Ulnar nerve: Soft neuroma at origin freed from dense scar-tissue. Median nerve: Hard neuroma at upper end excised, leaving 1½ in. gap. Nerve mobilised in forearm. Branches to pronator teres muscle had to be cut. No tension at suture-line.

CASE 6.—Learmonth's incision; clavicle divided. Median nerve: Lateral root small but no definite lesion. Musculocutaneous nerve: Hard neuroma excised; nerve sutured. Ulnar nerve: Hard neuroma at upper end excised; nerve sutured. Radial (musculospiral) nerve: Hard neuroma excised; nerve sutured without tension.

CASE 7.—Incision over anterior axillary border down to middle of forearm. Radial (musculospiral), ulnar, and median nerves exposed under pectoralis major muscle. Three inches of ulnar and median nerves deficient. Neuromata and gliomata excised. Nerves sutured. Ulnar transplant performed at elbow. Forearm muscles yellowish in parts, owing to ischæmic necrosis. Radial (musculospiral) nerve found tied with axillary artery. Suture removed. Lesion in continuity (axonotmesis). The radial (musculospiral) paralysis began to recover after six weeks.

CASE 8.—Learmonth's incision; clavicle divided. Severe scarring around anterior and posterior divisions. No lesions. Neurolysis performed. This patient had a median, ulnar, and partial radial (musculospiral) paralysis and made a rapid recovery by three months after operation.

CONCLUSIONS

Anatomically and surgically, gunshot wounds of the brachial plexus are accessible to repair by operation.

Learmonth's incision is excellent. The clavicle should be divided to give a dovetail fitting and is repaired by catgut suture of the coracoclavicular fascia.

In permanent total paralysis of the brachial plexus, arthrodesis of all the joints of the upper limb is preferable to amputation.

I wish to thank Prof. H. J. Seddon for encouraging me in the first instance, and Dr. Arthur Sunderland for the excellent anæsthesia, which was necessarily prolonged, and my assistant, Mr. T. G. Crombie, and later Mr. H. G. Stack, and Dr. A. M. Stewart-Wallace for his help in the neurological investigations.

TISSUE CHANGES
INDUCED BY *CL. WELCHII* TYPE A FILTRATES

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THE classical account of the histology of gas-gangrene in man is that of McNee and Shaw Dunn (1917) and the histology of the changes induced in animals by clostridia was described by Kettle (1919) and more recently by Kropp and Smith (1941); but little attention has been paid to the morphological changes induced by the toxins of the clostridia, nor have they been compared with the changes found in human cases of gas-gangrene.

This report deals with the microscopical findings in the tissues from experiments carried out by Macfarlane and MacLennan (1945) and their comparison with a limited number of specimens from cases of gas-gangrene.

HISTOLOGY OF NORMAL SKELETAL MUSCLE

It will be necessary to outline the normal histology of muscle in order that the changes observed may be correlated with the norm.

The muscle cell or fibre is a long multinucleate cell with peripherally arranged nuclei (sarcolemmal nuclei); the substance of the muscle fibre is occupied by the myofibrils (formed in large part of myosin) orientated in the long axis of the muscle fibre and divisible into various specialised zones. The rest of the sarcoplasm is occupied by certain inclusions and organoids. The limiting membrane of the muscle fibre is the sarcolemma, but there is little real evidence to suggest that it is anything other than a well-defined cell membrane and is certainly in no way analogous to the neurilemma surrounding the axon. It probably consists of a complex meshwork of lipid, lipo-protein, and protein molecules. There is no doubt that there is much confusion in histological writings as to what is meant by sarcolemma, and some writers use the term for a connective-tissue sheath enveloping the muscle fibre, but Häggquist (1932) in his detailed studies of muscle regards the sarcolemma as a double layer enveloping the muscle fibre. The inner layer, which he terms the primary sarcolemma, is a condensation of the sarcoplasm forming the cell membrane. Closely investing this is the outer layer which is a finely knit network of reticulin fibrils and this network is continuous from fibre to fibre in the longitudinal direction and merges with the tendinous insertion; this will be referred to here as the reticulin membrane of the muscle fibre (see fig. 3) and corresponds to Häggquist's secondary sarcolemma.

Between the individual muscle fibres there is a pattern of connective tissue formed of interlacing collagen and reticulin fibres, elastic fibres, capillaries, nerves, and mesenchymal cells (histiocytes, fat cells, undifferentiated mesenchymal cells, &c.); there are fine reticulin fibrils running transversely as braces between the reticulin membranes of the muscle fibres and the collagenous network of the endomysium, which is comparatively loose between the individual muscle fibres but becomes more condensed to form the perimysium surrounding bundles of muscle fibres and the perimysia blend to form the epimysia which in turn form the dense collagenous muscle sheath. The collagen fibres of this intermysial connective tissue also blend with the tendinous insertions.

There has been some doubt as to whether there are lymphatics in the endomysial connective tissue, but Florey (1927) showed that in the rat there was a rapid absorption of indian ink from the thigh muscles into the para-aortic lymph-nodes, and Le Gros Clark (1945), using the same technique in the rabbit, has demonstrated the existence of fine endomysial lymphatic capillaries draining into main vessels accompanying the intramuscular blood-vessels. It is not proposed to describe the neuromuscular connexions, nor the pattern of the capillary network, but further consideration must be given to the endomysial connective tissue. This connective tissue, like connective tissue throughout the body, consists of fibres and cells lying in a ground substance in a gel stage; this is formed of the constituents of plasma, collagen in a gel form, and mucoproteins. It should be recalled that collagen is almost certainly identical histochemically with reticulin, the difference between collagen, reticulin, and collagen sol being in all probability a matter of spatial orientation; in the sol form the molecules of the scleroprotein are widely separated, in reticulin fibrils they are arranged in a micelle and collagen is a further condensation of the scleroprotein molecules and it may well be that the micellar pattern of collagen is different from that of reticulin; certainly electron microscopy shows a regular cross-striated appearance (Schmitt, Hall, and Jakus 1942).

Throughout this paper the terms collagen and reticulin will be used in their histological sense: collagen referring to extracellular connective-tissue fibres which are birefringent, stain red with van Gieson, usually stain blue with the Mallory or Masson trichrome methods using aniline blue-acid fuchsin, and appear yellowish brown when untoned, or purple in toned sections stained with any of the modifications of silver impregnation based on the Bielschowsky-Maresch method. Reticulin refers to fine extracellular connective-tissue fibrils which are not birefringent, and do not stain with van Gieson, but stain blue in the Mallory or Masson trichrome methods using aniline blue-acid fuchsin, and appear black in either toned or untoned sections impregnated with silver by any of the modifications of the Bielschowsky-Maresch method.

HISTOLOGY OF MUSCLE IN GAS-GANGRENE IN MAN

In this account "gas-gangrene" will be used in the sense of a clostridial myositis[1] associated with severe constitutional symptoms as defined by MacLennan (1943). The analysis will be based on specimens obtained at the Radcliffe Infirmary, Oxford, at operation or autopsy from cases in which the main arterial supply to the region affected was intact.

Following the principle adopted by McNee and Shaw Dunn (1917) the changes at the spreading edge of the lesion will first be described followed by that in the more grossly involved portions of muscle.

The muscle fibres are separated from one another due to an increase in the endomysial connective-tissue space which has become "œdematous." The muscle fibres show a slightly greater affinity for eosin and the sarcolemmal nuclei disappear; this disappearance is due to karyolysis, and nuclei can be found in which the change has occurred to a variable degree, so that in some only isolated chromatin fragments are present, suggesting imperfect staining. The myofibrils are preserved, cross-striation is present, and they continue to be birefringent; however it would appear that Krause's membrane (the Z line) disappears; this is being investigated further and if confirmed is of considerable interest, for this membrane is believed by Häggquist (1932) and others to be of collagenous nature. The diameter of the fibres does not appear to alter significantly. The sarcolemma shows two changes but not constantly. The first is the appearance of fine fatty droplets which are set closely and evenly over the surface of the fibre; it is possible that there is a fatty change in the sarcoplasm as well, but the general impression is that the droplets are limited to sarcolemma. Fatty change in the muscle fibre is not peculiar to gas-gangrenous muscle; it may be seen in isolated fibres in normal skeletal muscle and is well-marked in certain conditions such as diphtheria; in gas-gangrenous muscle it is a widespread change but all the fibres do not show it. The second change, which can only be observed in muscle which has been fixed in saline formaldehyde, is the presence of minute brown refractile granules or rods in the sarcolemma which have the reactions of formol pigment. Formol pigment is an artefact which occurs in tissues in which there has been hæmolysis, and which have been fixed in unneutralised formaldehyde solutions; it is believed to be a precipitated hæmatin-formaldehyde complex (Becker 1926). Its occurrence in the muscle fibres may merely be a reflexion of red-cell hæmolysis in tissue in an area of acidosis, but it is often seen in areas where there is no overt evidence of hæmorrhage or gross hæmolysis and it is possible that it indicates the release of myohæmoglobin and the formation of an analogous insoluble complex.

1. It must be confessed that, though usage has adopted the term clostridial myositis to describe the local lesion in gas-gangrene, yet from a morphological viewpoint it is a misnomer, for the characteristic feature of a clostridial infection with constitutional symptoms is an absence of an inflammatory reaction in the local lesion and there is little doubt that clostridial myonecrosis is a more accurate descriptive term.

The reticulin membrane of the muscle fibre continues in close apposition to the sarcolemma and is not grossly altered at the spreading edge, and the increased space between the muscle fibres is due to an increase in the endomysial space which is occupied by œdema fluid, which appears to have a lower protein content than a pyogenic inflammatory exudate since it shows little affinity for staining with basic dyes. The nuclei of the connective-tissue cells have also undergone karyolysis but they are often preserved in areas where the sarcolemmal nuclei have disappeared. The isolated collagen fibres are widely separated and there appears to be a disappearance of the fine reticulin fibrils running between them and the reticulin membranes of the muscle fibres; the elastica is unaffected. Capillary walls can be made out but are usually empty or in some cases contain fat. In the tissue space there are numerous gram-positive organisms and fatty droplets of varying size. Fat cells are partially disrupted and contain fatty-acid crystals and around them fatty droplets are present. Small arterioles or venules are often observed to contain fat or they may contain degenerate leucocytes and red-cell stromata; some of the vessels may be partially occluded by fibrin thrombi. Areas of hæmorrhage may be present, and in these most of the erythrocytes consist merely of stromata from which the hæmoglobin has escaped. There is practically no fibrin formation in the connective tissue, as is commonly seen in an inflammatory œdema, or at the most a small amount of fibrin may be found in the vicinity of the larger vessels, nor is there any infiltration of polymorphonuclear leucocytes or histiocytes. Should the spreading edge of the lesion involve an area where there has been muscle trauma with commencing repair, or a pyogenic myositis, it can be seen that the leucocytes undergo karyolysis and destruction in the vicinity of the gram-positive bacilli.

In more advanced lesions, the changes described above are observed, but in addition there is a rupture and distortion of the muscle fibres, though the myofibrils are preserved, and, even in areas where the muscles are pultaceous, staining with phosphotungstic acid hæmatoxylin will reveal small fragments of myofibrils still maintaining their striational pattern though their orientation in relation to the muscle fibre is lost. The connective tissue also undergoes changes. The reticulin membrane of the muscle fibre becomes separated from the sarcolemma and there is disappearance of the fibrils; this disappearance is not usually complete, but when compared with normal muscle it is at once apparent that the amount of argyrophil fibrils is much less, the fibrils are fragmented and appear finer. The elastic fibres of the endomysial connective tissue are unaffected, but there is a diminution of the collagen fibres and reticulin fibrils in this zone, though, as is the case in the reticulin membrane of the muscle fibre, the disappearance is not usually absolute. There is no increase in the amount of free fat—indeed, the amount of free fat in the most severely affected portions of muscle appears to be less than that observed in the periphery of the lesion. In these areas the œdema may be less pronounced, the fragmented muscle fibres are often crushed together, and the space between the fragments is occupied by organisms and a fine granular debris which on critical microscopy can be recognised to be particles of myofibrillary material. Organisms are never seen to invade the intact or fragmented muscle fibre. Gas bubbles can be recognised as spaces scattered through the perimysial tissue.

In summary, in gas-gangrenous muscle there is a preservation of myofibrils but disruption of the sarcolemma and fragmentation of the muscle fibres. The fibres are separated by an œdema of the endomysial connective tissue, the reticulin membrane of the muscle fibre is separated from the sarcolemma, and there is partial to complete destruction of reticulin fibrils and collagen fibres, but elastica is unaffected. There is nuclear karyolysis and the appearance of extracellular fatty droplets, while fat cells show a breakdown to fatty-acid crystals. There is no vascular hyperæmia, little fibrin formation, and no neutrophil cellular reaction; indeed, leucocytes in the vicinity of a lesion undergo karyolysis and cytolysis.

It has not been possible to recognise healing lesions as described by McNee and Shaw Dunn, but it should be mentioned that in a pyogenic myositis or in repair following trauma the appearances are in striking contrast to those seen in clostridial myonecrosis. In such a lesion the muscle fibres are separated by a protein exudate rich in fibrin, there is vascular congestion and a well-marked cellular reaction both polymorphonuclear and histiocytic, and much fat is present both intra- and extracellular. The muscle fibres undergo phagocytosis, and during this process the myofibrillary pattern disappears; at first vacuoles appear between the longitudinal fibrils, birefringence is lost, and finally all striational pattern is lost, the muscle fibre having a uniform bright pink colour. The sarcolemmal nuclei proliferate to form new muscle fibres, and other fibres are formed from mesenchymal cells in the endomysial connective tissue. During the process of repair the original reticulin network of the fibre often disappears, while new-formed collagen and reticulin fibrils appear.

This description of the local lesion in gas-gangrenous muscle may be regarded as an amplification of the account given by McNee and Shaw Dunn and is in disagreement only in that they stated that cross-striational pattern is destroyed; they did not describe the disappearance of the connective-tissue fibres nor the appearance of free fat and fatty-acid crystals. Disappearance of collagen fibres in the endomysial connective tissue has been described by Kropp and Smith (1941) in experimental lesions induced by *Cl. welchii* in rabbits, but the changes in the reticulin membrane of the muscle have not, so far as is known, been described previously.

CHANGES IN TISSUE INDUCED BY *Cl. welchii* TYPE A FILTRATES

R. G. Macfarlane and MacLennan (1945) have described the changes observed as the result of the action of *Cl. welchii* type A filtrate and trypsin on human muscle in vitro and of intramuscular injection of the filtrate in rabbits. Specimens from these experiments were examined and further in vitro experiments were performed to study the histological effects of *Cl. welchii* filtrate and certain enzymes on human tissue.

In the rabbit experiment (rabbit no. 5 of Macfarlane and MacLennan's paper, 1945) 8·5 "rabbit MLD" of *Cl. welchii* type A filtrate was injected into the hind leg muscles of the animal over a period of 2 days, when it was then killed. A portion of the muscle was fixed in saline formaldehyde, frozen, and paraffin sections were prepared and stained for fat, reticulin, and fibrin in addition to the ordinary staining methods. The sections show a zone of myonecrosis with a relatively sharp line of demarcation (see fig. 1). At the border zone there is a collection of polymorphonuclear leucocytes, some of which are showing nuclear karyolysis. In the necrotic zone both connective tissue and sarcolemmal nuclei had disappeared, and the muscle fibres were fragmented, but cross-striation and birefringence of muscle fibrils had been to a large extent retained. The reticulin membrane of the muscle fibre had disappeared, as had the endomysial reticulin fibrils and collagen fibres, but the fragmentation of the muscle fibres was more extensive than the area of reticulin disappearance, and in the zone where fragmentation had occurred with partial preservation of the reticulin membrane, this was separated by a space from the fibre muscle (see fig. 2). Fine fatty droplets were present on the muscle fibres and in the endomysial space, and at the edge of necrosis both histiocytes and granulocytes contained fatty droplets. Vessels could not be identified in the area of necrosis but at the edge there was extravasation of erythrocytes and some of the arterioles contained thrombi. Although the muscle fibres were separated in the area of necrosis, the degree of œdema was not as great as is seen in specimens of human clostridial myonecrosis.

IN VITRO EXPERIMENTS

Technique.—Frozen sections of unfixed normal human muscle were prepared from an autopsy of a case in which death had occurred very shortly after a road accident and in which the interval between death and autopsy was short. These sections were incubated at 37° C in screw-capped bottles containing various mixtures of *Cl. welchii* filtrate, antitoxin, and other enzymes, and the sections were examined

at 6 and 22 hours. Some of the sections were tested for muscle disintegration by manipulation, others were examined microscopically unfixed, and others were fixed in saline formaldehyde and stained by hæmatoxylin and eosin and for fat and reticulin. The experiment was set up using the following solutions:

(*a*) Cl. welchii *filtrate experiments.*—(1) 1 c.cm. filtrate and 4 c.cm. buffer solution; (2) 1 c.cm. filtrate and 50 units of antitoxin and 4 c.cm. buffer solution; (3) 1 c.cm. filtrate, heated for 10 minutes at 100° C, and 4 c.cm. buffer solution; (4) 1 c.cm. normal saline and 4 c.cm. buffer solution; (5) 1 c.cm. saline and 50 units of antitoxin and 4 c.cm. buffer solution. In each of the five experiments the following buffer solutions were used: sodium borate and boric acid buffer mixture in 0·1 molar calcium chloride at pH 8·0, 7·4, 6·9; Sorensen phosphate buffer at pH 6·4, 6·0, 5·6. In addition an experiment was set up consisting of 1 c.cm. toxin and 4 c.cm. of 3·8% sodium citrate buffered at pH 6·4.

(*b*) *Other enzymes.*—Streptococcal hyaluronidase; streptococcal hyaluronidase with antiserum; streptococcal hyaluronidase heated for 10 minutes at 100° C; testis extract; testis extract heated for 10 minutes at 100° C; lipase (crude); lipase heated for 10 minutes at 100° C; crystalline trypsin solution; crystalline trypsin solution heated for 10 minutes at 100° C.

It will be unnecessary to describe in detail the findings in each experiment, many of which were formal controls, but the results may be summarised as follows.

Cl. welchii FILTRATE EXPERIMENTS

The muscle underwent no change in the buffer solutions except that in the most alkaline the sections appeared somewhat softer than in the other buffers. Reticulin impregnation was unsatisfactory in the sections which had been in phosphate buffer at pH 6·0 or 5·6; this was probably due to the reaction of the tissue interfering with the silver precipitation, for collagen could be demonstrated by Van Gieson staining with equal facility in all the buffer solutions. Exactly similar findings were observed in the experiments in which antitoxin or buffer solutions were used.

In the experiments in which the muscle sections were incubated with buffered *Cl. welchii* filtrate, it was found that at 6 hours the sections were inelastic and somewhat brittle, and this became much more definite at 22 hours, by which time the sections disintegrated with very little manipulation. Microscopic examination showed that at 6 hours there was a deposition of fine fatty droplets on the fibres which had maintained cross-striation of the muscle fibrils, the nuclei were unaffected but there was a diminution of reticulin; at 22 hours all reticulin had disappeared, the muscle fibres were fragmented both transversely and longitudinally and there was a slight degree of shrinkage, the nuclei had for the most part disappeared, and there was an increase of fat, but the myofibrils were unaffected (see fig. 4). The different buffers had no effect on the disappearance of reticulin or the fatty change in the muscle fibres, but karyolysis was more variable. The chromatin had partially disappeared in the more alkaline buffers and had completely disappeared in the middle range, but nuclei were preserved in the acid buffers. Sections stained by the Feulgen method showed that the portion of nuclear chromatin which had been dissolved was Feulgen positive, but that material staining with basophil dyes which was Feulgen negative had not been affected by the filtrate; this suggests that the filtrate has the ability to attack desoxyribonucleic acid, and this action of *Cl. welchii* filtrate is being further investigated.

In the experiments in which the muscle was incubated with buffered filtrate over-neutralised with antitoxin no change was observed, the muscle fibres, reticulin, &c. being quite unaffected, the appearance being exactly similar to the controls (see fig. 3).

In the experiments in which the muscle was incubated with heated filtrate no changes were observed after 6 hours, but after 22 hours there was a slight diminution in the reticulin membrane of the fibre and some fatty change in the muscle fibre, but no effect on nuclear staining; this suggests that the enzymal action of the filtrate is not extremely heat labile.

In the experiment in which muscle was incubated with filtrate and buffered sodium citrate it was hoped that this would inhibit the lecithinase activity of the filtrate by removing ionised calcium; it was found that the disappearance of reticulin and collagen was just as well-marked as in the muscle incubated with the buffered filtrate, but the fatty change was not observed on the muscle fibres nor was the karyolysis so pronounced; these findings suggest that the collagenase activity is distinct from the lecithinase activity and does not require ionisable calcium for its potentiation.

The effect of *Cl. welchii* filtrate on sections of unfixed liver was also studied. Incubation for 24 hours at 37° C in a mixture of filtrate and antitoxin showed no change in the staining characters of the cells or the reticulin and collagen fibres; on the other hand after 6 hours incubation at 37° C in a mixture of filtrate and buffer solution there was considerable disappearance of the intersinusoidal reticulin fibrils although the central and periportal collagen and reticulin fibrils were preserved; there was some karyolysis, but no detectable change in the sudanophil material. After 24 hours' incubation, the sections were brittle and inelastic, karyolysis was complete, all the intersinusoidal reticulin fibrils had disappeared, and the connective tissue of the periportal areas stained as reticulin rather than collagen (this is explicable if one accepts the view that the difference in colour reaction of the fibres after silver impregnation is an optical surface phenomenon and collagen fibres being partially dissolved would be finer and so behave as reticulin fibres). After these experiments had been completed, the work of Frazer, Elkes, et al. (1945) was published in which they studied, inter alia, the effects of *Cl. welchii* filtrate on guineapig tissues in vivo and in vitro; although they did not discuss the histological changes in great detail, yet in general they agree with the changes described here, though they describe the nuclear change as pyknosis rather than karyolysis and do not mention the effect of the filtrate on reticulin or the sarcolemma; but they state that there is gas formation in striated muscle incubated in vitro with the filtrate, an observation which was not found in the experiments reported here, and is difficult to understand.

EFFECTS OF OTHER ENZYMES ON HUMAN MUSCLE IN VITRO

Hyaluronidase.—In both streptococcal hyaluronidase and testis extract the sections became swollen and gelatinous and underwent some degree of disintegration, but did not develop the brittle and inelastic character seen after treatment with *Cl. welchii* filtrate. Stained sections showed that there was a disappearance of nuclei and some loss of cross-striation in the streptococcal hyaluronidase, but this was not observed with testis extract. In neither experiments was there any effect on sudanophil material, nor was reticulin or collagen affected, but in both solutions the reticulin membrane of the muscle fibre became separated from the muscle fibre itself, suggesting the possibility that there is a layer of mucopolysaccharide between the reticulin membrane and the sarcolemma which had undergone hydrolysis by the action of the hyaluronidase (see fig. 5). These changes were not observed in sections incubated in heated hyaluronidase or in streptococcal hyaluronidase and antiserum, though in the latter nuclear disappearance and diminution of cross-striation of the fibres was still observed. The discrepancy in the findings in the sections treated with streptococcal hyaluronidase and testis extract is explicable on the basis that the streptococcal filtrate used as a source of hyaluronidase contained other enzymes and the effects of these were not inhibited by the hyaluronidase antiserum.

McClean (1931, 1936) has shown that hyaluronidase has no direct effect on collagen fibres or "artificial" collagen and reticulin prepared by Huzella's technique. He did observe that there was definite splitting and swelling of the collagen fibres, and Astbury reported that X-ray diffraction studies suggested that this swelling was intermicellar and not intramicellar. This is in agreement with the findings reported here and supports Bensley's view (1934) that a layer of mucoprotein surrounds collagen fibres in tendons.

Lipase.—The sections softened and were difficult to manipulate, and microscopical examination revealed

much free fat and some loss of cross-striation of the muscle fibres but no effect on nuclei or collagen or reticulin. No changes were observed in sections incubated in heated lipase.

Trypsin.—The sections became white and swollen but maintained their elasticity; microscopical examination showed a loss of birefringence and cross-striation in the muscle fibres which stained a brighter pink with eosin and finally there was disappearance of the sarcous substance (see fig. 6). The nuclei appeared to swell and there was some blurring of outline of the chromatin threads but no karyolysis; there was no increase of

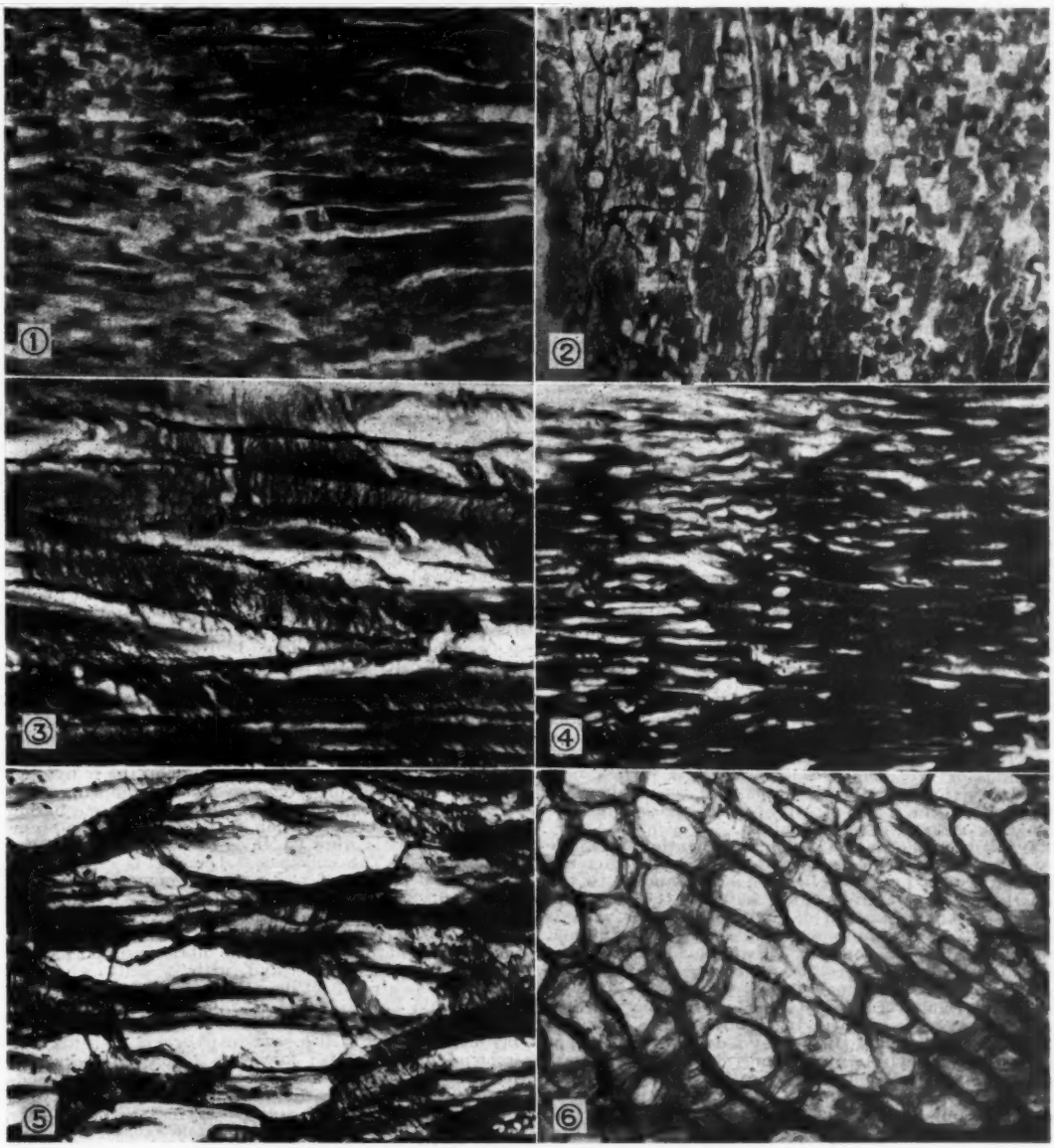

Fig. 1—Rabbit muscle injected with *Cl. welchii* filtrate in vivo. (Hæmatoxylin-eosin × 40.) This shows the line of demarcation between the normal muscle (right-hand side) and the necrotic muscle. The fragmentation of the fibres and partial disappearance of cell nuclei can be observed.

Fig. 2—Rabbit muscle injected with *Cl. welchii* filtrate in vivo. (Reticulin impregnation × 40.) This shows the necrotic zone, but it will be observed that the reticulin is still present on the left-hand side of the field though diminished in amount, but on the right-hand side it has completely disappeared: the fragmentation of the fibres can be clearly seen.

Fig. 3—Human muscle incubated for 22 hours with *Cl. welchii* filtrate over-neutralised with antitoxin. (Reticulin impregnation × 110.) The section shows the normal appearance of muscle and the reticulin membrane of the muscle fibre is well shown.

Fig. 4—Human muscle incubated for 22 hours with *Cl. welchii* filtrate. (Reticulin impregnation × 110.) The reticulin and collagen has completely disappeared, there is partial disappearance of nuclei, and there is both longitudinal and transverse fragmentation of the muscle fibres.

Fig. 5—Human muscle incubated for 22 hours with testis hyaluronidase solution. (Reticulin impregnation × 110). The muscle fibres and reticulin have been unaffected but the reticulin membrane of the fibre has separated from the muscle fibre proper.

Fig. 6—Human muscle incubated for 22 hours with crystalline trypsin solution. (Reticulin impregnation × 110.) This is a tangential section and shows that the reticulin and collagen is unaffected although there has been disappearance of the muscle fibres.

sudanophil material and no change in the reticulin or collagen although there was disappearance of elastica. No changes were observed in sections incubated in heated trypsin.

DISCUSSION

It has been shown that it is possible to reproduce in vitro, with bacteria-free extracts, the histological changes in the muscle in human gas-gangrene, with the exception of the œdema and gas formation, and these histological changes can be inhibited by antitoxin. This suggests that the changes in gas-gangrenous muscle are in large part due to the local action of the bacterial exotoxins; the œdema is probably a vital process possibly associated with increased capillary permeability, and the gas formation is associated with the bacterial metabolism.

Before considering the significance of this tissue change in relation to the properties of toxins of *Cl. welchii*, it will be necessary to discuss a remarkable feature of the local changes in gas-gangrenous muscle—the virtual absence of an inflammatory reaction to the presence of the organisms, even though there is little tendency for an invasion of the blood-stream.

Menkin (1940), in discussing the dynamics of inflammation, has suggested that the sequence to be observed in its development is (*a*) increased fluid passage through the capillary endothelial wall; (*b*) fixation as the result of a fibrinous network and capillary thrombi; and (*c*) migration of leucocytes. In clostridial myonecrosis it is reasonable to suppose that there is increased fluid passage into the tissue spaces, for not only is there the œdema of the tissues and considerable watery exudate, but it seems probable that part at least of the increase of lipoids in the tissue observed by R. G. Macfarlane and MacLennan (1945) is derived from the blood-stream; so far as is known, no special study has been made of the effect on capillary permeability of the exudate from gas-gangrenous cases or of *Cl. welchii* filtrates, though Miles and Miles (1943) have shown that in rabbits there is a considerable change in capillary permeability in the local lesions induced by the filtrate. On the other hand there is an almost complete absence of a fibrin network in clostridial myonecrosis and no vascular hyperæmia though the smaller vessels may be partially occluded by fibrin thrombi or may contain fat; nor is there any leucocytic migration into the area of myonecrosis, indeed leucocytes in the vicinity undergo lysis. In conformity with this absence of fixation there is an extensive local invasiveness which is delimited by structural barriers such as fascial planes rather than the inflammatory reaction usually associated with a bacterial infection; and yet, except as a terminal event, invasion of the blood-stream by *Cl. welchii* in gas-gangrene is extremely uncommon.

It has been shown in animals that invasion of muscle by *Cl. welchii* is dependent on the presence of bacterial filtrate or on the production of such damage to the muscle that the environment is suited to the growth of organisms and formation of toxin. Most war wounds contain *Cl. welchii* and there is invariably muscle trauma, but the proximate conditions that allow spores introduced into wounds to proliferate and form toxin are not clearly understood, though Mullally (1941) has given an excellent account of the anatomical circumstances which precipitate gas-gangrene. It is obvious, as Le Gros Clark and Blomfield (1945) have demonstrated, that almost any injury to a muscle must damage its intimate blood-supply and induce a local zone of ischæmic myonecrosis, but the gravity of symptoms in cases of anaerobic infection of ischæmic limbs following injury to the main vessels is seldom so severe as that occurring in a closed wound under tension where there is an enhanced lymphatic drainage; it is probable that the majority of cases described as gas-gangrene by Wood Power (1945) should be classed under the first category, for as MacLennan (1943) emphasises "gas-gangrene is essentially an infection of living muscle."

An attempt will now be made to integrate the subsequent changes associated with invasion of muscle by *Cl. welchii* with knowledge of the biological properties of its toxins. According to Oakley (1943) type A filtrate consists largely of alpha-toxin, theta-toxin, and possibly eta-toxin. McClean (1936) showed that a hyaluronidase was present in the filtrate. R. G. Macfarlane, Oakley, and Anderson (1941) showed that the Nagler-Seiffert reaction was due to breakdown of lipoprotein complexes, and since lecitho-vitellin activity ran parallel with the other properties of alpha-toxin they suggested that alpha-toxin might be of enzymatic nature; M. G. Macfarlane and Knight (1941) showed that *Cl. welchii* filtrate contained a lecithinase able to break down lecithin into phosphorylcholine and stearyloleylglyceride and suggested that the action of alpha-toxin is in fact due to this lecithinase. However, it appears from the observations of Crook (1942) that the filtrate can split lipoids and lipo-proteins at bonds other than those uniting phosphorylcholine and diglyceride and that almost certainly there are a number of lipolytic enzymes present and it may well be that a series of enzymes take part in the lecitho-vitellin reaction. The biological properties of theta- and eta-toxin are not clearly understood. R. G. Macfarlane and MacLennan (1945) have now shown that a further enzyme can be identified in the filtrate which has the property of dissolving collagen and reticulin and it is suggested here that the filtrate also contains a factor which induces nuclear karyolysis, possibly a desoxyribonuclease.

Accordingly, it should be possible to analyse the histological changes in terms of enzyme activity, though it must be recalled that it has not yet been shown that the enzymes formed by *Cl. welchii* in artificial culture media are all formed when *Cl. welchii* is proliferating in human muscle. The lecithinase will induce hæmolysis of erythrocytes presumably by its action on the lipoprotein layer of the red-cell membrane, and similar changes will occur in the cell membrane of the muscle cell, and the increased permeability may allow a transference of fluid from the cells into the tissue ground substance and be a factor in the formation of the interstitial exudate; the fatty droplets observed on the surface of the muscle cells and in the ground substance may be the result of the lecithinase activity on the plasma membranes of the cells or on the lipoproteins of the blood plasma.

McClean (1941) has emphasised the part which hyaluronidase may play in *Cl. welchii* infection, and it is clear that the ground substance, formed in part by mucopolysaccharides, will undergo hydrolysis and the reduction of viscosity in the intermysial connective tissue will facilitate the spread of the organisms. It also appears from the observations made in this paper on the effect of hyaluronidase on muscle that a layer of mucopolysaccharide is present between the muscle fibre and its reticulin membrane, which is not unreasonable, since Bensley (1934) has shown that in tendon the individual collagen fibres are surrounded by a layer of mucoprotein. The hydrolysis of such a layer of mucopolysaccharide would explain the separation of the reticulin membrane from the muscle fibre which is observed in clostridial myonecrosis. The collagenase activity is reflected in the disappearance of the reticulin membrane of the muscle fibre, and the intermysial connective tissue and the fragmentation of the muscle fibre can be explained as the result of the mechanical trauma of muscular contraction acting on a muscle fibre unsupported by its reticulin membrane and with a cell membrane weakened as a result of lipoprotein breakdown.

It should be recognised that in vivo destruction of the reticulin membrane is not peculiar to clostridial myonecrosis but is also seen in pyogenic myositis and ischæmic myonecrosis; however, the changes occurring in tissues in the body as a result of cutting off the blood-supply are not merely due to lack of circulating oxygen but are the result of active enzymal processes—for example, a portion of normal muscle excised from the body and kept under reasonably sterile conditions will not undergo gross histological changes for several days, whereas cutting off the blood-supply to a portion of muscle in the body will cause it to become necrotic in a matter of hours.

The absence of a polymorphonuclear reaction in clostridial myonecrosis is explicable in terms of cytolysis and nuclear karyolysis, though whether this is solely due to lecithinase activity or whether there are in addition in *Cl. welchii* filtrate other factors acting on nucleic acids cannot at the moment be stated with certainty. The breakdown of tissue-fat cells with the formation of fatty-acid crystals cannot be attributed to the lecithi-

nase described by M. G. Macfarlane and Knight (1941), but, as was suggested above, the work of Crook (1942) supports the view that a number of lipolytic enzymes are present in the filtrate and it is probable that an unidentified lipase is responsible for the release of fatty acids.

Two other features of clostridial myonecrosis remain to be explained—the well-marked exudation of fluid into the tissue spaces, and the relative absence of a fibrin network. It would be reasonable to suppose that the exudate is largely derived from the plasma as a result of increased capillary permeability, yet if this were the sole source of the exudate one would anticipate a considerable deposition of fibrin as well, but Reed and others (1943) showed that *Cl. welchii* filtrate contains a fibrinolysin which is present in the muscles of infected guineapigs; it is also possible that the fluid is in part derived from intracellular fluid which has been transferred from the muscle cytoplasm as the result of increased permeability and changes in the osmotic pressure of the interstitial fluid.

The absence of destruction of the myofibrils would indicate that *Cl. welchii* filtrate does not contain a proteolytic enzyme acting on myosin; myofibril destruction is constantly seen in muscle repair and infective myositis in the vicinity of histiocytes and neutrophil leucocytes and in certain myopathies associated with nutritional deficiencies.

Another of the local lesions in gas-gangrene—the formation of skin blisters or blebs—can be explained on the basis of the tissue changes induced by the filtrate. The epidermis is fixed to the dermis by the basement membrane of reticulin and the interlacing collagen and reticulin fibrils of the dermis. Baumberger et al. (1942) have shown that the epidermis may be separated from the dermis by the action of heat or the application of weak alkalies, and that this separation is due to a change in the physical state of the collagen; this effect on collagen may not be the whole explanation of the phenomenon since it is possible to produce a separation either at the dermic epidermic junction or between the basal layers of the epidermis and the Malpighian layer (the usual line of separation in a thermal blister). However, in the blebs in gas-gangrene the separation is at the dermic epidermic junction, and this can be interpreted as an effect of the collagenase of the filtrate; it is possible that the observation of Chain and Duthie (1940)—that *Cl. welchii* filtrate produces greater spread in skin than would be anticipated by its hyaluronidase activity—may also be explained on the collagenase activity of the filtrate.

Although it has been possible to analyse the histological changes in clostridial myonecrosis in terms of enzyme activity, yet, when one's analytical weapon is the bouillabaisse of enzymes that *Cl. welchii* filtrate appears to be, it is impossible to determine with certainty which of the individual enzymes that have been identified is responsible for each tissue change. However, the use of pure enzymes of comparable activity, or the use of filtrates in which the proportionate enzymal activity is known, should facilitate a more critical analysis. Nevertheless, these experiments may remind histologists that enzymal analysis of tissues, which is one of the oldest methods of the microscopist, has a useful place in modern critical histology. Its use has in recent years been revived by the cytologist in the study of chromosomes (Frolova 1944), identification of nucleic acids (Davidson and Weymouth 1944), &c., but it clearly has a wide field of application in normal and pathological histology.

The evidence presented by R. G. Macfarlane and MacLennan and confirmed here—that most of the local lesions in gas-gangrene can be explained by the action of the filtrate, and that these changes can be prevented by the local action of antitoxin—may well have an immediate practical application in treatment. It is a truism that gas-gangrene need never occur, and when it does occur is due either to delay or to inadequate surgical treatment, yet there are wounds in certain sites, in particular the back and buttock, in which adequate excision of the damaged tissues may be wellnigh impossible, and in such cases local injections of antitoxin around the area of the wound appear to be indicated, for not only would this neutralise the toxin and so limit the spread of the myonecrosis, but by so doing would stop the lysis of phagocytes which could then destroy the bacteria; this mode of treatment is the more rational if one accepts Macfarlane and MacLennan's suggestion that the systemic symptoms in gas-gangrene are not due to circulating toxin.

The recommendation that antitoxin should be used locally is not new, but the arguments and evidence in favour of it have either been ignored or forgotten in recent memoranda on the treatment of gas-gangrene. Bullock and Cramer (1919) as the result of animal experiments suggested that antitoxin should be injected locally if it is being used prophylactically—that is to say, within a few hours of wounding. In the MRC Report (1919), in which the value of serum therapy is discussed, it was found that of the 38 cases treated with serum which recovered only 5 were reported in which recovery occurred in spite of insufficient surgery and 4 of these (reported by Ellis) had received local treatment; in conclusion the report states: "The fortunate results reported by Ellis were, we believe, due in large measure to the inoculation of serum into and around infected tissues." More recently Larson and Pulford (1930) described a considerable measure of success with local injections, and Gordon and McLeod (1941) unwittingly again put forward Bullock and Cramer's recommendation, yet the MRC Memorandum on Gas-gangrene (1943) states: "there would seem to be no particular advantage in injecting antitoxin into the region immediately around the wound."

As this paper is primarily concerned with the local lesion in gas-gangrene, it would not be profitable to discuss in detail the pathogenesis of the systemic changes which must be reviewed in the light of Macfarlane and MacLennan's observations. However, when freed from the biased assumption that the changes are due to circulating toxin, it is clear that the systemic changes observed both in man and animals have a striking similarity to those occurring in traumatic shock and in particular to those occurring in association with muscle trauma and ischæmia.

Aub (1944) has shown that, in dogs, it is virtually impossible to free the muscles from *Cl. welchii*, and that after muscle compression shock only occurred when the muscle exudate contained clostridia; this naturally raises the question whether "muscle shock" is solely due to products of muscle destruction or whether the action of *Cl. welchii* is essential for the production of the systemic effects. Stonor and Green (1944) have presented experimental evidence in support of their attractive hypothesis that adenosine triphosphate may be one of the factors in "shock" production, but there are many difficulties in its acceptance and not the least are the observations of Bollman and Flock (1944), who showed that experimental shock does not develop unless the circulation of the limbs has been occluded for more than three hours before it is restored and that by that time all adenosine triphosphate has been destroyed and no more is resynthesised. The frequent presence of degenerative renal changes with pigment casts in gas-gangrene further emphasises the affinity between its systemic effects and muscle trauma, yet the wide range of conditions in which "anuria with pigment casts" develops, from certain forms of toxæmia of pregnancy to blackwater fever, suggests that the renal changes should be regarded as a reflexion of a systemic vascular disturbance rather than a primary disorder of the renal tract.

In an earlier paper (Robb-Smith 1941) it was suggested that fat-embolism might be induced by enzymal action on the lipoproteins of the plasma analogous to the lecithinase activity of *Cl. welchii* toxin, and Frazer, Elkes, et al. (1945) have shown that fat-embolism can be induced in guineapigs and rabbits with *Cl. welchii* filtrate and have described the occurrence of fat-embolism in fatal cases of gas-gangrene in man. Although fat-embolism, whether arising as a result of the associated trauma or consequent on the action of the toxins of the clostridia on the infected tissue, may be a contributory factor in the fatal outcome in gas-gangrene in man, yet it is extremely unlikely that the systemic effects observed in gas-gangrene are mainly due to the effects of fat-embolism, for the symptomatology of the two conditions is very different and in most cases examined the amount

of fat-embolism observed at autopsy has not been very considerable. A word of caution must be given as to the significance to be attached to the histological presence of fat in the lung capillaries in cases of gas-gangrene in which autopsy has not been performed immediately after death. Putrefaction and gas formation proceed very rapidly after death, and in cases in which there has been several hours' delay it is not uncommon to find large amounts of fat in the veins draining the area of infection; it is almost certain that this has been displaced as the result of the tension induced by the gas formation and possibly as the result of the post-mortem multiplication of the organisms in the blood causing a breakdown of the lipoprotein complexes of the plasma. This appearance is not observed in autopsies performed soon after death and is regarded as an artefact.

SUMMARY

The histology of the local muscle lesion in gas-gangrene in man has been compared with the changes occurring in human muscle in vitro as the result of the action of *Cl. welchii* type A filtrate and are considered to be morphologically identical, save for the absence of œdema or gas formation. An attempt has been made to analyse these changes in terms of the action of the enzymes known or suspected to be present in the filtrate, and it appears that the alterations are due to effects on cell membranes, cell nuclei, collagen and reticulin, and mucoproteins, and that the myofibril is unaffected. The lack of cellular reaction is not due primarily to the ischæmia but to the cytolytic action of the filtrate, and since these changes can be inhibited by antitoxin it is suggested that local injection of antitoxin might be used where it has proved impossible to perform an adequate surgical excision of the affected tissue.

This paper is merely a more detailed histological confirmation of the observations of Macfarlane and MacLennan, and had it not been for their germinal idea and ready collaboration and advice could not have been written. I would wish to thank Mr. R. E. Duffett for the care he showed in preparing the sections and Mr. B. Amos for the preparation of the enzyme solutions. The *Cl. welchii* filtrate and antitoxin were kindly provided by Dr. J. W. Trevan of the Wellcome Physiological Research Laboratories, the hyaluronidase by Dr. Douglas McClean, and the trypsin and lipase by Prof. R. A. Peters.

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CASUALTIES FOLLOWING EXPOSURE TO ZINC CHLORIDE SMOKE

ERNEST H. EVANS, M D LOND., M R C P
MAJOR RAMC

IN the open, zinc chloride smoke is held to be innocuous though it is known to be dangerous in confined spaces. The inhalation of high concentrations in the vicinity of a generator may also give rise to unpleasant symptoms. In Malta, a few people developed minor symptoms on exposure in the open to the concentration of zinc chloride used in screening the harbour. These symptoms, which may last a few hours, consist of slight respiratory distress with a "constricting feeling" in the chest, dryness of the throat, and perhaps a slight cough. On one occasion massive exposure resulted in a number of severe casualties.

DESCRIPTION OF INCIDENT

On Feb. 11, 1943, between 8.30 and 9 AM, 79 smoke generators stored 80 yards from one entrance in Corradino tunnel became ignited and burned for half an hour. The tunnel is 200 yards long, with offshoots, and the air capacity has been roughly estimated at 100,000 cubic feet. The smoke generators contain hexachlorethane and zinc oxide together with small quantities of calcium silicide and an igniter composition. The smoke resulting from the interaction of these substances consists mainly of finely particulate zinc chloride together with carbon and carbon dioxide.

Of 116 people believed to have been in the tunnel at the time of the incident about 70 were exposed to the fumes; 34 of these passed through the nearby first-aid station, and one other was taken on board a ship in the harbour where he died within a few minutes. Of the 34 treated at the first-aid station, 2 died there; 15 were sent to the 90th General Hospital, of whom 6 died; and 17 were sent to their homes. Of the 17 sent home, 3 were subsequently admitted to the 90th General Hospital, and 1 of these died. The total of deaths was therefore 10.

The casualties were exposed to an extremely high concentration of zinc chloride smoke estimated at ½ lb. per cubic yard near the generators.

DESCRIPTION OF CASUALTIES

At the first-aid station all cases complained of dyspnœa, a feeling of constriction in the chest, and retrosternal and epigastric pain. All had stridor and red and running eyes. The majority also had a cough with copious expectoration. The man who died shortly after being brought to the FAS appeared to drown in his own secretions.

Of the 15 cases admitted to hospital 3 hours later, one was already dead and another was moribund on admission, did not react to treatment, and died within the hour. The remaining 13 men were all complaining of difficulty in breathing and speaking very hoarsely or in a whisper; all complained of pain in the throat and nasopharynx and all but 2 of restrosternal pain or a feeling of constriction in the chest. All had a painful paroxysmal cough, 10 with abundant blood-stained sputum. Both inspiration and expiration appeared difficult and 7 had distinct laryngeal stridor. Epigastric pain and nausea were present in most and a few retched and vomited. All but 2 showed a pale grey, earthy-hued cyanosis. In no case was any appreciable venous congestion noted. All had reddened conjunctivæ, 2 with actual burns of the cornea, and 4 had small vesicular burns on the forehead or wrist.

Pulse-rates ranged from 76 to 130 per min., being over 100 in the majority; respiratory rates were raised to a variable extent and at first there was no fever. The blood-pressure readings showed no significant abnormality, the only two abnormal readings being 100/70–60 mm. Hg in a boy of 16 years who was badly shocked and 180/100 in a man aged 53, an obvious hypertensive who subsequently died.

The nasopharynx was red, injected, and angry-looking in every case. A striking feature was the absence of abnormal physical signs in the chest, only a few having scattered moist adventitious sounds. Epigastric tenderness was present in most, but well marked in one case only. Many of the patients were agitated and very

restless; mental distress was more obvious in the local than in the British personnel.

For the next few days the clinical picture was that of an acute inflammation of the whole of the respiratory tract, the nasopharynx, larynx, trachea, and bronchi, with associated respiratory difficulty and developing bronchopneumonia. Frequent painful paroxysmal cough, with blood-stained sputum, attacks of dyspnœa, nasopharyngeal, retrosternal, and epigastric pain, headache, and in some cases retching and vomiting, were the most prominent symptoms. The temperature rose in all but two, subsiding again in most cases by the 4th to 7th day. The majority continued to present a pale cyanotic colour which was difficult materially to affect with oxygen and in severe cases persisted for almost a week. Between the 2nd and 4th days almost all developed auscultatory changes in the lungs, chiefly moist adventitious sounds, though a few showed signs of patchy consolidation. Towards the end of the first week, purulent sloughs of mucous membrane were found in most sputum mugs. Although venous congestion was expected, and venesection was considered in every case, in only one case was it performed and then without the classical indications being present.

Two cases died on the 3rd and two more on the 4th day. Of these, three were over 50 years of age and the other was 42. All four developed a patchy bronchopneumonia with finally moist sounds over both lungs. The disparity between the severe and distressing symptoms and the paucity of physical signs in the lungs was striking even in these cases. Venesection was performed on one of them with no apparent effect.

A tracheotomy set was kept instantly available but no case developed laryngeal obstruction from detachment of sloughs although shreds of purulent mucous membrane were often expectorated.

Three cases were practically well by the end of the first week, and after the 7th to 10th day the remainder began a slow and rather tedious recovery. Several developed a recurrence of their pyrexia, and in one case a lung abscess resulted. The aphonia slowly cleared and the cough and expectoration ceased. Six weeks after the incident all but two were up and about; of the two who were still confined to bed one was the man with the abscess of lung and the other was the youth of 16 who had been very ill and was now convalescing.

PATHOLOGY

In only two cases was permission for autopsy obtained. The first died within 4 hours of the incident and the second on the 3rd day.

In the first case the mucous membrane lining the larynx, trachea, and bronchi was red and very œdematous; a patch of ulceration about the size of a threepenny bit was seen at the bifurcation of the trachea. The lungs were very œdematous, the heart showed right-sided dilatation, and the brain and abdominal viscera were acutely congested.

The second autopsy demonstrated a similar but far more advanced change in the respiratory passages, the mucous membrane being necrotic and stripping off leaving a raw inflamed surface. The bronchi were filled with thin yellow pus. The lungs showed bronchopneumonia and engorgement. The heart was normal. An interesting feature, correlated clinically with the nausea, vomiting, and epigastric pain, was the reddened, thin mucous membrane of stomach and duodenum. The small and large gut were normal. Liver, kidneys, and brain were congested, but no toxic changes were found in liver or kidneys microscopically.

The following report on photomicrographs of the lungs is supplied by the pathologist, Major E. Geal, RAMC:

> The macroscopical appearances in the lungs of bronchopneumonia and engorgement were confirmed microscopically. In addition the epithelial lining of the bronchi is destroyed and they are filled with a fibrinous exudate, pus, and in some cases with blood alone. In the non-pneumonic areas there is œdema and acute emphysema. The rupture of the alveolar walls has resulted in large irregular air vesicles. Another striking feature is areas of hæmorrhage particularly well marked in the subpleural region.

These findings confirmed the clinical impression that the effect of the smoke was primarily one of severe damage to the mucous membrane of the nasopharynx and respiratory tract. The deaths occurring immediately or within a few hours were apparently the result of shock and a profuse outpouring of secretion water-logging the lungs. The cases which survived long enough developed bronchopneumonia as a complication of the initial lesion. Extensive damage to the nasopharynx and larynx with expectoration of sloughs of bronchial mucous membrane did not necessarily prevent ultimate recovery.

TREATMENT

Warmth and absolute rest were ensured as soon as possible after exposure. Almost all patients were nursed propped up with a back-rest. Transfusion was avoided owing to the already existing pulmonary œdema and the danger of right heart failure. Nikethamide was used where indicated.

Although complete relief of the cyanosis was very difficult to obtain, oxygen, given by BLB mask, was undoubtedly the most important single factor in treatment. Administration was in many cases rendered difficult by the intermittent nasal obstruction resulting from inflammation and congestion. Profuse expectoration, retching, and vomiting, although not preventing continuous administration, were a definite handicap, as were the restlessness and mental distress in many patients.

The prognosis was materially better in the stoic than in the hysteric. Although morphine was contra-indicated because of its depressing effect on the cough reflex, in most cases agitation was so great that it had to be given. The relief obtained appeared fully to justify its use. With its aid oxygen could be administered far more effectively and the restlessness with its associated cardiac strain was allayed. In one case, after gr. ¼ at night, there were signs of collapse in the right upper lobe next morning, but the collapsed area re-expanded in the next 48 hours. Atropine gr. 1/100 was given with each dose of morphine, but when given alone had no appreciable effect on the respiratory distress.

For the distressing recurrent laryngeal stridor, steam inhalations in a tent or from improvised inhalers, and hot applications to the throat, were used. In some cases the steam inhalations appeared to give relief. Spraying the throat and larynx with a cocaine solution was used in one case only and then without benefit. With such an extensive raw area cocaine was thought to be dangerous, and it might have interfered with the cough reflex already depressed in many cases by morphine. Alkaline gargles and mouth-washes were used for the inflammation of the mouth and nasopharynx.

Frequent small feeds of diluted milk, with alkalis, were adopted in cases with epigastric pain and vomiting. In only one patient did such symptoms persist beyond the third day, and he was symptom-free by the fifth day.

Superficial burns of the face, hands, and conjunctivæ all reacted well to treatment except the 2 men with corneal ulceration who were transferred to the ophthalmologist after the first week.

All patients on the second day were started on a course of sulphapyridine, consisting of an initial dose of 2 g. followed by 1 g. 4-hourly for 2 days and then 0·5 g. 4-hourly for 3 days. A repeat course was found necessary in 5 cases. Expectorants were given to all.

DISCUSSION

The harmful effect of the smoke may have been in part due to the heat of the particles as these were given off in such high concentration and so confined a space, but the hygroscopic or astringent nature of the zinc chloride was possibly the most potent noxious factor.

The particulate form of the irritant resulted in a slightly different picture from that described after exposure to the gases used in warfare. The air passages in the present cases appeared far more damaged than the lung itself. This may account for the absence of the gross venous congestion which was expected. Venesection is second in value only to oxygen administration in the treatment of the lesions resulting from exposure to lung-irritant gases. Yet, in the cases described here, the cyanosis was of the pale grey type, not the full congested cyanosis of acute pulmonary œdema which benefits dramatically from venesection. The difficulty of relieving the leaden cyanosis with oxygen was alarming. Obstruction of the nasal passages and interruption of

administration by retching and vomiting did not seem entirely to account for this.

Finally, it must be emphasised that the respirator affords complete protection against this and other particulate smokes.

SUMMARY

The clinical picture of 17 men exposed to a high concentration of zinc chloride smoke is described. The main effect was damage to the mucous membrane of the nasopharynx and respiratory tract; the air passages being more severely affected than the lungs from venous congestion was not a feature; the pale grey cyanosis did not readily respond to oxygen, and did not respond at all to venesection. Morphine was useful in allaying restlessness and anxiety.

Technical information concerning the smoke and the incident were supplied by Captain D. G. Hervey, gas officer, Malta Command. The autopsies were performed and the report on microscopic sections supplied by Major E. Geal, RAMC. Photomicrography was carried out by Alan Horsler, RAMC, laboratory technician.

ACUTE PULMONARY MYCOSIS

REPORT OF A CASE

ELIZABETH DELIKAT, M D BRATISLAVA

ASSISTANT PATHOLOGIST TO THE ROYAL HOSPITAL, WOLVERHAMPTON

With a note by S. C. DYKE, D M OXFD, F R C P

DIRECTOR OF THE PATHOLOGICAL DEPARTMENT

SINCE the publication of the first report by Hughes Bennett (1844) [1] an extensive literature has developed concerning mycotic infections of the lungs. All cases so far recorded have been chronic, and in many it is doubtful whether the fungus was the primary cause of the disorder, a secondary invader, or even an accidental finding. No case of indubitable primary acute and fulminating mycotic infection of the lungs appears yet to have been placed on record; the clinical similarity to acute lobar pneumonia in the present case was very close and it seems probable that on this account similar cases may have escaped detection in the past. It is for this reason and on account of the dramatic response to iodide that the present case is reported.

A nightwatchman in an iron works, aged 59. Admitted to hospital on July 30, 1943. In good health until July 23, when while on his rounds at night he suddenly felt sick and chilly. Although he felt ill and fainted several times, he carried on with his work until the 27th, when he began to have pain in the chest; he developed a severe headache and had a rigor. He took to his bed, his main symptoms being headache and insomnia, pain in the chest, and shivering attacks, and he started to expectorate a little blood-stained sputum. He was admitted with a diagnosis of lobar pneumonia.

On admission his skin was hot and moist; temperature 101·8° F, pulse-rate 100, respirations 30 per min.; no dyspnœa; no definite signs of consolidation in the lungs; fine dry râles at both bases, right more than left, and some harsh breath sounds at the right base. X-ray films on July 31 showed some enlargement of hilar glands and congestion at both bases, consistent with recent lobar pneumonia. Treatment was started with sulphapyridine as for lobar pneumonia, 2 g. at once and thereafter 1 g. four-hourly. As the patient did not show any signs of improvement after 48 hours this was changed to sulphathiazole and later to sulphadiazine. Throughout this time there was cough but no expectoration. The patient's general condition steadily deteriorated; he became restless, uncoöperative, and at times delirious. On Aug. 4 he became incontinent of urine and fæces, and on Aug. 6 bed-sores developed on the buttocks; dissolution appeared to be imminent.

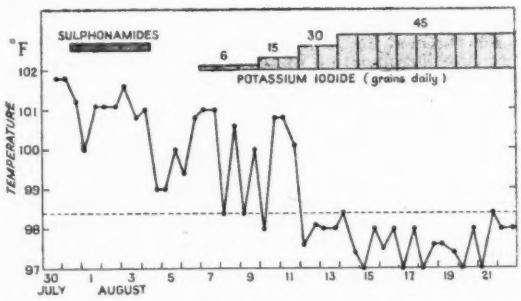


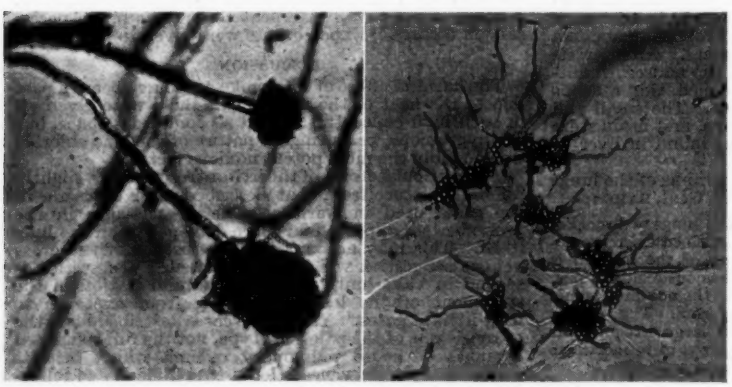
Fig. 1—Temperature and treatment chart.

On Aug. 7 a specimen of sputum was for the first time obtained and submitted to the laboratory. It consisted of thick tenacious mucus containing a few whitish flecks. On microscopical examination these white flecks were found to be masses of mycelial threads. No cocci or organism of any sort other than the mycelium could be seen in the films. These very unusual appearances at once raised the possibility of mycotic infection and it was suggested that potassium iodide should be given a trial. This was begun in a dose of gr. 6 t.d.s. Next day, Aug. 8, it was found that cultures on nutrient agar at 37° C had given a pure growth of *Aspergillus fumigatus*. A further specimen of sputum on the 9th still showed the mycelium without other organisms. The patient appeared in less danger of death. The next day he was obviously improving; the dosage of iodide was raised to gr. 15 t.d.s. Improvement became even more rapid; by Aug. 11 it was evident that the patient was out of danger. The dosage of iodide was thereafter increased as shown in fig. 1. Recovery was rapid and uneventful. The patient started to get up on Aug. 21 and left hospital on Aug. 27. Seen at his own home a month later he appeared perfectly well.

The aspergillus from this case was subcultured on to nutrient agar with 1% glucose. On this it maintained its peculiarity of growing readily at 37° C but refusing to grow at room temperature. Dr. J. T. Duncan of the Emergency Public Health Laboratory, Winchester, kindly examined subcultures of the mould and reported the fungus to be *Asp. fumigatus* "of rather more exacting thermophilic requirement than is usual with the species."

In an attempt to infect a young rabbit with the fungus, about 1 c.cm. of a saline suspension was injected into the lung. The rabbit gave no signs of ill health; a radiogram taken two days later showed shadows in the injected lung but these rapidly cleared.

1. Bennett, J. H. *Trans. roy. Soc. Edinb.* 1844, **15**, 277.



(*a*) (*b*)

Fig. 2—*Aspergillus fumigatus*: (*a*) sporing heads; (*b*) spores with emergent hyphæ.

Note by Dr. DYKE

Proof of the ætiological relationship of the aspergillus found in the sputum to the clinical manifestations in this case cannot be regarded as absolute. Before she

had completed her work on the immunological aspects Dr. Delikat was, at the request of the Czechoslovak Government, granted leave by the Royal Hospital to become a member of the First Medical Mission now in Czechoslovakia. Using a saline extract of both mycelium and conidia after ether and alcohol washing, Dr. Delikat had been able to demonstrate precipitins in the patient's serum; further work had to be broken off before completion and is therefore not reported. Taking all aspects of the case as reported into consideration there seems little room for reasonable doubt that it actually does represent an example of acute pulmonary aspergillosis. In spite of deficiencies in the recording it has therefore been considered worthy of reporting as illustrating two important points:

First, in spite of search through English, American, and Continental literature, Dr. Delikat was unable to find reference to any similar case, and this does actually appear to be the first instance of acute pulmonary mycosis to be reported.

Secondly, this case illustrates very perfectly the function of the clinical pathologist in bringing about close liaison between the wards and the hospital laboratory. The fact that the presence in a specimen of sputum sent to the laboratory of mycelium without accompanying organisms was noted in the laboratory as striking and peculiar and led to immediate consultation with the officer in charge of the case was the means of making clear the nature of the infection and undoubtedly of saving the patient's life.

Medical Societies

MEDICAL WOMEN'S FEDERATION

AT a meeting on May 16, Lieut.-Colonel ALBERTINE WINNER spoke on

Social Medicine in Women's Services

Much Service medicine, she said, is social medicine in a highly compact but varied community. The Service MO can influence the environment of those under his care, since the combatant turns to him for advice on housing and feeding his troops, and on their work and their play, their morale and their problems. The good Service MO adapts himself and becomes a valued and busy member of his unit: the less adaptable, unreconciled to the loss of clinical opportunities, remains bored and dissatisfied and complains of insufficient work. Some 650,000 women have been employed in the Services in Britain, Canada, and the USA; in the British Forces they include women doctors and dentists serving with the RAMC and ADC, nursing officers of the QAIMNS and TANS, the VAD, and last but not least the ATS—200,000 strong, used at home and abroad in over 100 different trades and employments to release men for the forward areas. Two factors limit the ways in which they serve: their physical strength is inferior to that of men (taking the average, not the exceptional); and public opinion, probably biologically sound in this case, decrees that women shall not be exposed in the front line or wield or fire lethal weapons. In the British Army one woman replaces one man in most jobs; in a few, which impose greater physical strain or longer hours, the replacement ratio is 5 : 4 or 3 : 2. But some three-quarters of the ATS replace a man on a one-for-one basis. Women have taken readily to Army life, gaining weight soon after entry and showing great improvement in poise, carriage, and self-respect. An investigation of hæmoglobin levels (unpublished) has shown that the average figure of 96% on entry rises to 100% after six months and 103% after a year. Sickness rates of men and women show some interesting differences. The hospital admission rate for men has been half as much again as that of women; whereas the women's admission rate to camp reception stations (for minor ailments only) has been nearly double that of the men. These differences can be partly accounted for by the higher average age of the men, a different social attitude to minor illness in women, and different administrative arrangements for the two sexes; but women have certainly lost more working time than men over minor sickness, though this is possibly compensated by their better record for major sickness. There was a high incidence of head-lice among recruits fresh from civil life, but once women are in the Service the incidence becomes very low. In recruits the incidence was lowest in those from the south, and increased towards the north, reaching a maximum in the great northern towns, the west of Scotland, and, highest of all, Ireland, where the figures have been quite staggering. 'Lethane 384 Special' has done much to clear these heads, and DDT is now under trial. The high incidence shows the need for health education.

A survey (to be published) showed that a quarter of the recruits had amenorrhœa on entry, and a further 10% had other menstrual anomalies. Amenorrhœa usually only lasted three months but in a few cases up to nine months or a year, requiring endocrine treatment. Only 47·5% of these normal women were entirely free from menstrual pain and symptoms, while 20% had symptoms severe enough to interfere with games or work. Under 4% had ever consulted a doctor about their symptoms though 20% dosed themselves. Over half the recruits (mostly under 19 years old) had some deformity or anomaly of the foot, while a quarter had disability enough to justify treatment. Foot troubles are of two main types: deformities of the forefoot, largely clawed toes and bunions caused mainly by faulty shoes in adolescence; and long-arch disabilities (pes planus and valgus deformities) due to faulty posture, poor nutrition, insufficient rest after illness, and other social causes. More careful shoe-fitting, simple remedial classes, education by precept and by film, were introduced, but Colonel Winner pointed out that this is a job for the family and school doctors, who should be preventing the development of foot troubles. A questionnaire to some 3000 officers and auxiliaries (aged 18–45) showed that about half had suffered from chilblains at some time in their lives, and about a third were having them at the time of the investigation. The incidence rises steadily with age, at any rate up to 40, and there seems to be a familial factor. Only 2% had been prevented from working by their chilblains, but about 10% said they had been hindered in their normal activities at some time. Sedentary indoor employments had a higher incidence than active outdoor jobs, but among cooks and signals operators (who work in a warm atmosphere) the incidence was low. Sedentary workers were prone to chilblains on the hands, while those who stood a lot got them on their feet.

Psychiatric breakdown has been far the biggest cause of medical discharge from the ATS, sometimes due to separation anxiety, sometimes to dislike of Army life or employment, or to the attempt to carry on a job and a home at the same time. There has been a low incidence of peptic ulcer in women, possibly, Colonel Winner suggested, because women have less need to express conflict as a somatic symptom—"nerves" being a more respectable diagnosis in women than in men. The sum of peptic ulcer and psychiatric discharges is nearly the same in the two sexes, which seems to confirm this view.

WOMEN WITH THE ROYAL AIR FORCE

Wing-Commander E. V. BUTLER-JONES described the care of 180,000 WAAFs. The RAF do not keep together in formations as do the Army, but are posted according to their jobs, with the result that WAAFs are distributed throughout RAF stations in numbers varying from 20 to 5000. On most stations they form only a small fraction of the station strength. WAAF nursing orderlies take a course of training lasting from 8 to 12 weeks and replace men on a one-for-one basis in hospitals and sick-quarters, and on suitable stations; they have been an unqualified success. The RAF also employs women as medical technicians—dispensers, physiotherapists, chiropodists, laboratory assistants, radiographers, and operating-room assistants, in all of which jobs they replace men on a one-for-one basis. WAAF hospital catering officers supervise the feeding arrangements for patients in all RAF hospitals at home and overseas.

Sickness-rates for WAAF, for both minor and major illness, have been nearly double those of the men. This may be partly due to the fact that the women are encouraged to go sick more readily than the men, but that cannot account for the higher rate of more serious illness. Diseases peculiar to women have only contributed about 5% of total sickness annually. Malingering is negligible. The common infectious diseases

(except venereal disease, where the rate for men is very much higher, and pneumonia, where it is the same) are all much commoner in the women than in the men. Possibly the women in the past have led more secluded lives than the men, and the proportion of non-immunes may therefore be higher. Women also show an appreciably higher rate of psychopathic disorders; but, like Colonel Winner, Wing-Commander Butler-Jones had found that when the invaliding rates for gastric and psychopathic disorders are added together the discharge-rate for men and women is very close.

She too had found 'lethane special' easy and quick to use in the treatment of pediculosis, giving a failure-rate of only 0·98%. But head-lice, she said, are a civilian rather than a Service problem, for while 25% of civilians on entry have been found infested, an annual survey of 100% of Service women has shown a rate of only 1% infestations, which is considered very creditable, since some reinfection from civilians is inevitable.

About 8 per 1000 WAAFs attend the gynæcological clinics annually for menstrual disorders, out of a total attendance of 25 per 1000 for all gynæcological complaints.

In 1942 the practice of examining all WAAF entrants by miniature radiography was begun, and by July, 1943, some 60,000 women had been examined; only about 3% were assessed as abnormal. A full-size film shows about half of these to be normal; after which the remainder are fully examined and kept under observation. Cases of active tuberculosis are invalided, while inactive cases are dealt with on their merits. A total incidence of 0·94% tuberculous cases was found in this series, 0·36% being active and 0·58% inactive; 0·08% had positive sputum. The incidence of tuberculosis was found to be higher in WAAF than in RAF in the ratio of 4:3. Among the men under 30 the highest incidence between the ages of 20 and 24; but after 34 the incidence is higher than that, and rises each year, which throws doubt on the common opinion that tuberculosis is mainly a disease of the young adult.

Reviews of Books

Mass Radiography of the Chest

HERMAN E. HILLEBOE, MD, medical director of the tuberculosis control division, US Public Health Service; RUSSELL H. MORGAN, MD, medical officer in charge of the radiology section of the division. The Year Book Publishers; H. K. Lewis. Pp. 288. 21*s*.)

A RECENT Medical Research Council report gave an account of the first extensive fluorography surveys in England; and this concise manual from America is partly an account of achievements in the technical field. Many different types of unit are described. Technical developments include the phototimer, which eliminates time-wasting measurements of thickness of the chest; this, with the automatic camera, simplifies procedure greatly. A chapter on roentgen diagnosis of the chest seems intended to provide an easy guide to differential diagnosis for the uninitiated—a purpose it can hardly achieve and should not attempt. Apart from this, a large number of rare and gross conditions have been illustrated, but only very few of the early lesions which it is the main object of mass radiography to detect.

The most important, though briefest, chapters are those discussing objectives of tuberculosis control and methods of planning for mass radiography of a community. Dr. Hilleboe's approach to this is in the first class; he sets the case-finding task of mass radiography in its proper context of a full programme of tuberculosis control. Among many enlightened suggestions are those aiming at coöperation between the mass-radiography unit and health departments, local medical societies, medical officers of sanatoriums, welfare agencies, and particularly labour and management organisations. This book is a valuable contribution to the study of an increasingly important subject.

Bibliography of Visual Literature, 1939-44

JOHN F. FULTON, PHEBE M. HOFF, HENRIETTA T. PERKINS. (Charles C. Thomas. Pp. 117. $3.)

THIS list covers only problems of vision as they emerged during the years of blackout and in offensive air activity, and such other aspects of visual efficiency as were emphasised by war conditions. Many of the 3347 entries refer to out-of-the-way publications. Entries concerning physiology, visual examinations, and trauma constitute the bulk of the bibliography, with sections on anatomy, corrections of ocular defect in military personnel, training for military specialities, goggles, illumination, and visibility. Though incomplete as a guide to ophthalmic literature it will be useful to specialists on these subjects.

Annual Review of Biochemistry

Vol. XIII. Editors: J. MURRAY LUCK; JAMES H. C. SMITH. (H. K. Lewis. Pp. 795. 30*s*.)

CRITICISM of the annual review is almost an impertinence: the only question is how biochemists ever did without it. In the 1944 volume, most of the 26 articles refer to papers which appeared in 1942 and 1943; but since every subject cannot be reviewed each year, some contributors cover relatively long periods. The chemistry and metabolism of the proteins and carbohydrates are dealt with at length, as usual. Hassid, in his article on the chemistry of the carbohydrates, confines himself to the polysaccharides, since these have not been treated in the two previous years, and there have been notable recent advances; and Blicke writes on the antispasmodics—a new branch of pharmacology which has crept on us almost stealthily.

Year Book of Urology 1944

Editor: OSWALD S. LOWSLEY, MD, FACS. (Year Book Publishers; H. K. Lewis. Pp. 416. 18*s*. 6*d*.)

THIS little annual, under the able editorship of Dr. Swinney Lowsley, is a worthy successor to its predecessors. It is especially useful to the general surgeon called upon to deal with urogenital problems, since it contains a valuable survey of current work on the use of sulphonamides and penicillin in both urinary infections and venereal diseases. An article by the late H. G. Bugbee on a simple operative approach to the kidney containing recurrent calculi is rightly given prominence. Attention is drawn in several articles to the use of stone solvents such as Suby's Solution G, and an adaptation of a South American native remedy, which has apparently proved satisfactory in the treatment of encrusted phosphatic cystitis when administered per rectum. Three cases of reconstruction of the membranous urethra following damage associated with fractured pelvis are described, and two articles deal with modern methods of treating traumatic avulsion of the skin of penis and scrotum. The illustrations are good.

Modern Cosmeticology

(2nd ed.) RALPH G. HARRY, FRIC, with a foreword by P. B. MUMFORD, MD, FRCP. (Leonard Hill. Pp. 432. 35*s*.)

THE cosmetic trade has emerged from small beginnings into an industry of great economic importance, which can afford to employ some of the best brains in the field of commercial chemistry. Modern cosmetic formulæ are based on the chemistry of oils, fats and waxes, and of many other organic and inorganic substances, and chemists devising them need to know much about the anatomy, physiology, and biochemistry of the skin. Textbooks of dermatology give little detail on relevant points, so it is inevitable that the chemists should write manuals containing a good deal of dermatological as well as chemical data. The dangers are obvious, especially since physiologists, histologists and clinicians have not yet agreed on many of the relevant issues; and this book certainly contains many inaccuracies. But it is useful despite them. Doctors interested in dermatology will be stimulated by Mr. Harry's views on skin absorption and penetration, the rôle of the "acid mantle," and what he terms the bio-electric phenomena of skin. He deals fully with the composition and preparation of many cosmetics, including creams, powders, lip-salves, mud packs, deodorants, depilatories, shampoos, shaving lotions, brilliantines, and anti-sunburn lotions, and even with such other matters as permanent waving, mouth washes, dental preparations, eye lotions and insect repellants; and his chapter on emulsions is short and clear. But his book can be recommended only to those who have the gift of discrimination.

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THE LANCET

LONDON: SATURDAY, SEPTEMBER 22, 1945

Freedom from Disease in the Tropics

Prof. J. F. BROCK, of Capetown, has lately given an account of a tour through Central Africa,[1] in which he comments on some of the diseases affecting the indigenous inhabitants. The old familiar names are there—malaria, yellow fever, trypanosomiasis, hookworm infestation, schistosomiasis, and filariasis—and the frame in which this gloomy picture is set is that of almost universal malnutrition. "The problem of malnutrition in Africa has no boundaries. In the Union it rests upon the twin foundations of ignorance and ancestral prejudice on the one hand, and poverty on the other hand. In Central Africa it has the same foundations." These remarks call to mind the series of papers by TONKIN, MEARS, TOBIAS, PATERSON and JOYNT [2] in which the state of malnutrition in the people of the Transkei was set out in plain language. There, says MEARS, "fifty or sixty per cent. of the children die through malnutrition before reaching the age of two years"; and they mention other diseases besides those referred to by BROCK—tuberculosis, venereal disease, typhus, and plague. The studies of KARK and LE RICHE,[3] and of GILLMAN and his associates,[4] on malnutrition and some of its extreme manifestations in Bantu children in the Union of South Africa present the reader with more precise information; they stimulate not only the scientific but also the humanitarian imagination with a story of miserable ill health, a compound of wretched diet and parasitic infestation, which recalls the conditions reported from the occupied countries of Europe, from the famine areas of Bengal, and among the war refugees of China (LAYCOCK [5]). Before the war the Committee on Nutrition in the Colonial Empire [6] had already made recommendations for the improvement of feeding which, if carried out, would bring the unfortunate peoples health such as they have not yet known.

In an address delivered last July to the industrial advisory committee of the Ross Institute,[7] Dr. G. MACDONALD, the new director of the institute, surveyed the principal health hazards that interfere with the development of tropical industry. He spoke of malaria, dysentery, malnutrition, scrub typhus and yellow fever, laying emphasis always on methods of control or betterment, for which his wide military experience gave warrant. Means have been found to protect troops against the insect-borne diseases, and to ensure adequate diet, because the success of military campaigns depended on their good health; likewise in tropical industry the means of protecting labourers have been applied because they are to the economic benefit of the industrial undertakings. But military and industrial needs are limited, and although we now know how to prevent or cure most of the parasitic and nutritional diseases of the tropics, the state of the general population of too many countries is poor—indeed in some places desperate. BROCK writes of ignorance and poverty as prime causes, and a similar theme runs through the account of the Committee on Nutrition in the Colonial Empire. Food taboos; local customs whereby suitable foods are not produced, or are exported for trade, or are disregarded; inefficient farming and misuse of land; failure to develop a fishing industry where this would be possible; the keeping of domestic stock as a mark of social importance rather than as a source of food—these factors are of course of enormous importance. They may be met by the proposed education and demonstration schemes and by official encouragement of particular industries and agricultural ventures. But in some parts the position seems to be so bad that more immediate action is needed to deal with a situation which, from the humanitarian standpoint—which, surely, is the standpoint of medicine—is intolerable.

Care for the health of backward peoples is recognised to be a duty of government, and recent decisions on programmes for the restoration of prosperity in the West Indies, and on expenditure of large sums under the Colonial Development and Welfare Act, are evidence of this recognition. Moreover, governments faced with epidemic disease have taken drastic steps—as in war or industry—to protect the people. In East Africa, large transfers of populations subject to sleeping-sickness have been made, and within the last few years the great venture of the Anchau settlement in Nigeria, for the same purpose, has been launched. These have proved highly successful, but they have not been achieved without some interference with the liberties of the people. Persuasion has been used to the utmost to induce the Africans to accept a new mode of community life, and has been supported by free provision of public services such as water-supplies and agricultural aid; but behind the persuasion has been the determination of the government to see the thing through, though with the minimum of compulsion. The restriction of their freedom to be inefficient and wasteful of natural resources has given to the people of Anchau freedom from much of their former ill health—which is surely to their benefit. The government has taken this step, not so that the African can become a more effective unit of production for profit, but because as a human being he is entitled to the rights, and should assume the duties, of protection against disease.

In another paper BROCK [8] has said that "it is not the responsibility of the medical profession to decide what are the best remedies for malnutrition, but it is our responsibility to insist that a remedy be found." The remedy lies in political and economic, no less than in medical, organisation and education, and if present methods will not provide good health, then, as in the face of epidemics, governments should more vigorously adapt their policies to the needs of the people. The Anchau settlement is a precedent.

1. Brock, J. F. *S. Afr. med. J.* 1945, **19**, 34.
2. Tonkin, A. H., Mears, G., Tobias, J. M., Paterson, R. L., Joynt, E. P. H. *Ibid*, 1943, **17**, 151 et seq.
3. Kark, S. L., Le Riche, H. *Ibid*, 1944, **18**, 100.
4. Gillman, T., Gillman, J., Inglis, J., Friedlander, L., Hammar, E. *Nature, Lond.* 1944, **154**, 210.
5. Laycock, H. T. *Brit. med. J.* 1944, i, 667.
6. First report of the committee, appointed by the Economic Advisory Council. Cmd. 6050 & 6051. HM Stationery Office, 1939.
7. London School of Hygiene and Tropical Medicine: report of a meeting of the Ross Institute Industrial Advisory Committee, July 12, 1945.
8. Brock, J. F. *S. Afr. med. J.* 1943, **17**, 219.

Polyarteritis Nodosa and Drug Sensitivity

FOR nearly eighty years pathologists have been intrigued by polyarteritis nodosa; but only lately, with the writings of LEISHMAN[1] and others, have its clinical manifestations been crystallised sufficiently for it to be thought of at the bedside in patients displaying, as SPIEGEL[2] puts it, "a disproportion between the number and intensity of the symptoms and the disease which is assumed to be their cause." Its pathogenesis, moreover, has remained in doubt. In the past, like other disorders of obscure causation, it was attributed to many different agents, such as syphilis, a "virus" and toxic injury. In 1925 GRÜBER[3] suggested that it might be due to hypersensitivity, and its frequent association with asthma and other allergic troubles[4] supported this view. Since then the observations of RICH at Johns Hopkins have given a new twist to the hypersensitivity hypothesis, which has also been broadened by recent case-reports in our own columns. RICH[5] described 8 cases in which polyarteritis nodosa was associated with hypersensitive reactions to foreign sera and sulphonamides, and with GREGORY[6] produced polyarteritis nodosa in rabbits by establishing a condition analogous to serum sickness. It was not always necessary that the animals should first be sensitised to the foreign protein, for the lesions could be induced by the injection of a single large amount of foreign serum. In these experiments the addition of sulphonamides did not seem to influence the development of hypersensitivity or vascular lesions.

As early as 1937 HAGEMAN and BLAKE[7] called attention to the "toxic drug fever" of the sulphonamides, characterised by a rash, pyrexia, and arthritis; but, though hypersensitivity to these drugs was often reported, greater attention was paid to the more serious "toxic" manifestations—anuria, agranulocytosis, and hæmolytic anæmia. The anuria was attributed to the precipitation of sulphonamide crystals in the urinary tract, while the blood affections were put down to direct toxic chemical depression of marrow activity or to a maturation arrest consequent on enzymal substitution. These explanations, however, did not explain all the untoward effects, and when LEDERER and ROSENBLATT[8] gave the first detailed account of the lesions in fatal cases of sulphonamide anuria, none of which showed mechanical obstruction in the urinary tract, they postulated that the widespread focal necrosis observed was a reflection of a hypersensitivity reaction. DAMESHEK,[9] describing hæmolytic anæmia with cold hæmagglutinins arising during sulphonamide therapy, thought that the drug might turn the patient's red cells into an antigen, leading to the formation of an agglutinating antibody which might be potentiated by the infection for which the drug was being given. He also drew an analogy between sulphonamide anuria and the anuria associated with blackwater fever or an incompatible blood-transfusion; in both groups of conditions a purely mechanical explanation of the anuria had proved untenable, and MAEGRAITH[10] has stressed the more likely vascular explanation for the broad group of conditions characterised by anuria with pigment casts. Meanwhile DAVIS,[11] following the classical methods of LANDSTEINER and LAMPL, had succeeded in conjugating sulphonamide compounds in human blood-serum with the production of antigens, and this work was confirmed by WEDUM[12] and others, who showed that the conjugated sulphonamides could induce anaphylaxsis in animals. Once it is established that conjugated sulphonamides can act as antigens it follows from the experiments of RICH and GREGORY that these drugs might produce polyarteritis nodosa. ROSENAK and MASCHMEYER[13] have reported a case associated with sulphadiazine therapy; one of RICH'S patients had received only sulphathiazole; and BLACK-SHAFFER[14] has described five cases of sulphonamide sensitivity in which the striking lesions were a necrotising fibrinoid arteritis with scattered areas of necrosis in the organs and an interstitial cellular exudate rich in histiocytes. Though none of BLACK-SHAFFER'S cases showed the classical lesions of polyarteritis nodosa, the histological analogy between the hyperergic arteritis and polyarteritis is so close that there can be little doubt that the sulphonamides may cause the latter condition, —though they rarely do so.

The evidence of grave sensitisation sequelæ to the arsphenamines is less striking. Anaphylactoid crises have been described, of which one of the more spectacular is a thrombocytopenic purpura; and a rare and serious complication is a hæmorrhagic encephalitis of which Russell[15] described examples. This form of encephalitis is essentially similar to that associated with sulphonamide medication, and a morphological counterpart has been produced by JERVIS[16] in animals developing the "Forssman carotid syndrome." Characteristic neurological disturbances without general signs of anaphylaxis are seen in guineapigs when a small amount of serum containing Forssman antibodies is injected into the carotid artery; the symptoms and focal demyelinisation with vascular changes are attributed to a local anaphylactic reaction of the Arthus type occurring as a result of the reaction between the injected antibody and the antigen normally present in brain tissue. In our issue of Aug. 18, MILLER and NELSON recorded a case of polyarteritis nodosa developing during arsphenamine therapy, in which the patient showed signs of drug sensitivity. Experimentally arsphenamine in conjunction with serum protein can act as an antigen and produce anaphylactic shock, and in this case the drug must be held suspect though its guilt was not proven.

Thiourea and thiouracil are comparative newcomers to therapy, and the frequency of sensitivity reactions to them is somewhat alarming. In a large series, such as that of WILLIAMS and CLUTE,[17] as

1. Leishman, A. W. D. *Lancet*, 1937, i, 803.
2. Spiegel, R. *Arch. intern. Med.* 1936, **58**, 993.
3. Grüber, G. B. *Virchows Arch.* 1925, **258**, 441.
4. Harkavy, J. *Arch. intern. Med.* 1941, **67**, 709.
5. Rich, A. R. *Bull. Johns Hopk. Hosp.* 1942, **71**, 123, 375.
6. Rich, A. R., Gregory, J. E. *Ibid*, 1943, **72**, 65.
7. Hageman, P. O., Blake, F. G. *J. Amer. med. Ass.* 1937, **109**, 642.
8. Lederer, M., Rosenblatt, P. *Ibid*, 1942, **119**, 8.
9. Dameshek, W. *Ibid*. 1943, **123**, 77.
10. Macgraith, B. G. *Trans. R. Soc. trop. Med. Hyg.* 1944, **38**, 1.
11. Davis, B. D. *Science*, 1942, **95**, 78.
12. Wedum, A. G. *J. infect. Dis.* 1942, **70**, 173.
13. Rosenak, B. D., Maschmeyer, R. H. *Lancet*, 1945, i, 305.
14. Black-Shaffer, B. *Arch. Path.* **1945**, **39**, 301.
15. Russell, D. S. *J. Path. Bact.* 1937, **45**, 357.
16. Jervis, G. A. *Arch. Path.* 1943, **35**, 560.
17. Williams, R. H., Clute, H. M. *J. Amer. med. Ass.* 1945, **128**, 65.

well as in smaller groups, 10–15% of cases have shown reactions—leucopenia, "drug fever," urticaria, &c.—all hallmarks of the anaphylactic type of response. Up to date the reported fatalities have been few, and have usually been due to agranulocytosis, but GIBSON and QUINLAN [18] have lately reported a case of polyarteritis nodosa arising in the course of thiourea therapy, and MARINE and BAUMANN [19] have described similar vascular lesions in a small proportion of rats fed on thiouracil. While polyarteritis nodosa is liable to appear spontaneously in the rat, the evidence in the human case strongly suggests that the drug can be a precipitating factor in the vascular lesions. It will naturally be asked whether penicillin, too, is liable to produce serious hypersensitivity reactions. All that can be said here is that no serious ones have yet been described. Urticarial reactions have been reported in about 15% of cases, but they may be due to impurities in the commercial product; except for a single report [20] there has been no evidence of serum sickness. On the other hand, WELCH and ROSTENBERG [21] have described a tuberculin type of hypersensitivity to crystalline sodium penicillin and a similar type of reaction has been observed in this country with commercial penicillin of both British and American manufacture.

Few would suggest that, because certain valuable drugs occasionally produce severe and even fatal reactions as a result of hypersensitivity, these drugs should be withdrawn from clinical practice. Nevertheless, it should be recognised that the potent remedies given us by the modern laboratory cannot be used as a placebo as could the haustus flavus of the old pharmacopœias. Furthermore, "drug fever" should no longer be regarded as a tiresome event and ignored: it is a sign that the patient has been sensitised to the drug and is therefore a definite danger signal, particularly in diseases such as acute rheumatism and arthritis. Lastly, since it seems unlikely that chemotherapeutic substances can be prepared which will not form antigenic conjugates with serum proteins, research should be undertaken into the most effective methods of desensitisation and attempts should be made to find non-specific measures which will prevent or lessen the consequences of drug hypersensitivity.

Uniqueness of the Individual

LIFE would not be worth living were it not for our deeply sincere conviction that somehow we are different from everybody else. Science has dealt kindly with this important little foible. The uniqueness of the individual, for some time now a genetic truism, is fast becoming something that can be demonstrated in a test-tube.

Fifty years ago, more or less, serological analysis was seen by NUTTALL [22] and others to provide an exciting new method for the piecing apart of animal relationships. Inject human serum into rabbits, and an antibody is duly formed which precipitates with the serum of other primates in proportion to their zoological affinity to man. So long as serology contented itself with showing up the grander affinities of evolution, it could do no more than reinforce the conclusions of orthodox comparative zoology; but methods similar in principle were soon found to resolve animal relationships of any degree, from phylum through class, order, and genus to species, subspecies, and individuals. It is true that one cannot very easily distinguish rabbit serum from (say) a hare's by injecting either into cattle. That is hardly to be wondered at; the parallax, so to speak, is too fine. But UHLENHUTH [22] showed that if the serum of hares is injected into rabbits, the required distinction is brought to light: the immune body so formed reacts with hare's serum but not with the serum of rabbits. This technique has been followed to its logical conclusion by injecting an animal with antigenic substances from other members of its own species. (Rabbit and hare are of different genera—*Oryctolagus* and *Lepus*—believe it or not.) The reagents of immune systems generated within the compass of a single species are distinguished by the prefix *iso-*; so we speak of "iso-antigens" and "iso-antibodies." By injecting a chicken with the pooled blood of other chickens, TODD [23] obtained a complex of iso-antibodies which, having reacted to completion with the blood of any one, still retained the power to agglutinate the red cells of all the others. The "absorption," as it is called, may be repeated to the same effect with blood from a second chicken or a third. These results, equally valid for cattle, point to the serological uniqueness of the individual.

The same conclusion is being reached from the study of human blood-groups, so rapidly that it is no longer clever to predict it. The A-B-O, M-N, and the varieties of the Rh antigen systems can only be a few among those that have yet to be discovered, but they already segregate the human race into hundreds of blood families. The great value of this approach is that the particulate and combinatorial nature of individual differences is never for a moment lost sight of; we differ from each other, as MENDEL taught, not by unique endowments, but by unique *combinations* of endowments. Skin-grafting tells the same story more clearly still. It is quite impossible to graft skin with permanent success between human beings or rabbits of ordinary genetic diversity. Probably there are as many skin-transplantation groups as there are rabbits, but 127 have been proved to exist.[24]

What lies at the root of these differences between individuals? It may be that, in a rather special sense, each individual has distinctive chemical compounds (particularly proteins) within him. The geneticist frowns on this view because, if too naïvely interpreted, it contains within it a refutation of one of the canons of mendelism. Physical and chemical methods have certainly confirmed the serological evidence of species differences between, for example, the hæmoglobins, and MUNRO FOX [25] has found spectroscopic differences between the bloods of individual rabbits, though not of earthworms and human beings. But our working hypothesis must be that individual differences are the outcome of having different *combinations* of genetically or serologically

18. Gibson, P. C., Quinlan, J. T. *Lancet*, July 28, 1945, p. 108.
19. Marine, D., Baumann, E. J. *Arch. Path.* 1945, **39**, 325.
20. Price, D. E., Donald, J. M., White, E. L. J. *Amer. med. Ass.* 1945, **128**, 183.
21. Welch, H., Rostenberg, A. Jr., *Ibid*, 1944, **126**, 10.
22. *See* Karl Landsteiner's The Specificity of Serological Reactions, Harvard, 1945.
23. Todd, C. *Proc. roy. Soc.*, B 1930, **106**, 20; *Ibid*, 1935, **117**, 358.
24. Medawar, P. B. (1945) *J. Anat., Lond.* 1945, **79**, in the press; cf. *Ibid*, 1944, **78**, 176.
25. Fox, H. M. *Nature, Lond.* 1945, **156**, 18.

defined substances. It can of course be argued that if, as SCHRÖDINGER [26] has lately insisted, genes and chromosomes have so much of the physical integrity of molecules that they can be usefully regarded as such, then our individual chromosomes *are* distinct chemical compounds. This is the "rather special sense" spoken of above. Having acknowledged its somewhat tortuous validity, it can be dismissed.

The serological uniqueness of the individual may have some exciting consequences. It has for some time been known that in the case of serum-proteins,[27] as well as of red-cell antigens, there is a "one-to-one correspondence between the presence of specific single genes and specific antigens"; and, as a general rule with fairly well-defined exceptions,[28] there is "no evidence for gene interaction, either between allelomorphs or between genes at different loci." [29] Since the serological identification-mark of the individual is such a faithful fingerprint of his gene complex, may one not guess that the antigens themselves are "rather direct gene products"? HALDANE [30] thinks so: it is the most economical hypothesis, just as it is the most economical hypothesis to suppose that the voice which comes from the gramophone is made by a little man right inside the box. The hypothesis can be put to empirical test, and STURTEVANT [29] has lately shown how. For the antibodies produced by these antigen-genes should react with the genes themselves, and either put them out of action or (perhaps less plausibly) cause them to undergo mutation. EMERSON [31] has tested this latter possibility with suggestive if hardly conclusive results. It is noteworthy in this connexion that the immune system set up by skin homografts very likely acts by blocking nuclear division in the cells of the grafted skin.[24] Soon someone will graft skin from one mouse to another which differs from it by only a single gene. Will the phenotypic expression of that gene be suppressed in the grafted skin? It is almost a test case. In this sort of way, perhaps, serology will give the geneticist the weapon which he most sorely lacks: that which the biochemist has in cyanide and iodoacetate, and the serologist himself in the technique of absorption: the *specific inhibitor* of gene-determined processes.

26. Schrödinger, E. What is Life?, Cambridge, 1944.
27. Cumley, R. W., Irwin, M. R. *J. Immunol.* 1943, **46**, 63.
28. Irwin, M. R. *Genetics*, 1939, **24**, 709.
29. Sturtevant, A. H. *Proc. nat. Acad. Sci. USA*, 1944, **30**, 176.
30. Haldane, J. B. S. Perspectives in Biochemistry, Cambridge, 1937.
31. Emerson, S. *Proc. nat. Acad. Sci. USA*, 1944, **30**, 179.

Dr. JOHN PARKINSON will deliver the Harveian oration at the Royal College of Physicians of London on St. Luke's day, Thursday, Oct. 18, at 3 PM. He will speak on rheumatic fever and heart disease.

Dr. P. A. BUXTON, FRS, professor of medical entomology in the University of London at the London School of Hygiene, and Sir ALEXANDER FLEMING, FRCP, FRS, professor of bacteriology in the university at St. Mary's Hospital, have been appointed members of the Medical Research Council.

WE have to announce the death of Dr. JAMES HENDRY, regius professor of midwifery in the University of Glasgow, on Sept. 9, within a few days of his 60th birthday. Dr. Hendry was also medical director of the Glasgow Royal Maternity and Women's Hospital, deputy chairman of the Central Midwives Board for Scotland, and a member of the Goodenough Committee.

Annotations

TOO MANY DOCTORS IN THE RAF?

OUR leading article of Sept. 8 expressed astonishment at the news that the Royal Air Force proposes to maintain its medical establishment at the same level as during the war—i.e., at between 2·2 and 2·3 per 1000 total strength. "Civilians," we said, "are no doubt liable to exaggerate the difference made by the end of the fighting; but this difference can scarcely be negligible." We are assured, however, that in fact the medical requirements of the RAF remain as great as they were last year or the year before. Though during the war there were heavy losses in aircrew killed or missing, the RAF Medical Service has never had to care for any large number of wounded at one particular time: there was rather a daily attrition, as the RAF was continuously in action. In peace the risk of injury during training is as high as in war, since instruction is very intensive; and the proportion of RAF personnel injured at games or in road accidents is much higher. Furthermore, a larger proportion of the Force is stationed in relatively unhealthy areas overseas. The general effect of these differences is that the number of admissions to hospital from all causes (sickness, injuries, and wounds) has been no greater during the war than in the previous years, and cannot be expected to decline with the return of peace. At 2·2 per 1000 (1·5 in the United Kingdom and Western Europe, including staffs of hospitals, boards, teaching and research establishments, and headquarters), the medical establishment of the RAF is stated to be lower than that of any other Service of modern times, in peace or war. We are informed that since hostilities ceased a number of hospitals have been reduced in size or closed, and the allotment of medical officers to stations has been lowered, both at home and abroad. These economies are offset, however, by new commitments. For example, the quota of patients formerly treated in EMS hospitals will come directly under Service care; men who have developed tuberculosis while in the RAF are being treated in the RAF for periods up to 8 months; many medical officers must be taken away from their present duties for special training (e.g., to replace civilian consultants and specialists now being released); and the RAF Medical Service will again have to undertake the care of RAF families on an increasing scale. The RAF consists of relatively small units scattered very widely; it controls huge areas in Africa and elsewhere, and on overseas flying routes it has a great many isolated stations where doctors must be kept not only to deal with the unit but also to treat casualties arriving by air, or crashes among the numerous aircraft using these staging posts. Those bearing the responsibility for efficient medical care at all these points feel that an establishment of 2·2 doctors per 1000 is no more than sufficient for their present needs.

Clearly the time has come when the various Service departments should be told what proportion of our medical resources they may expect to retain or recruit. To this subject we shall shortly return.

PENICILLIN IN RAT-BITE FEVER

LAST October the successful treatment of a case of rat-bite fever due to *Streptobacillus moniliformis* was described in our columns by Kane,[1] and in an accompanying annotation[2] the hope was expressed that penicillin therapy would turn out to be equally successful in the spirillar form of the disease. This hope has now been realised: Wheeler[3] has had the opportunity of using penicillin in 5 cases of the disease, 1 of which was due to *Spirillum minus* and the rest to the streptobacillus, with gratifying results in all. The patients were babies,

1. Kane, F. F. *Lancet*, 1944, ii, 548.
2. *Ibid*, p. 540.
3. Wheeler, W. E. *Amer. J. Dis. Child.* 1945, **69**, 215.

of ages ranging from 5 weeks to 6 months, and the penicillin was given in 3-hourly injections of 5000 units, continued for 7–10 days—some 300,000 to 400,000 units in all. This is about twice the amount required by Kane for his patient aged 15. It is of interest that all but one of Wheeler's cases were due to the streptobacillus, and other recent American reports of successful treatment of the streptobacillary disease emphasise that this form of the disease is much commoner than the spirillar.

The ages of Wheeler's patients are perhaps surprising to readers in this country, where rat-bite fever is rare and not noticeably commoner in infancy. A paper by Richter[4] from Baltimore analyses a series of 65 patients with rat-bites treated at the Johns Hopkins Hospital in four years, all coming from an area of two square miles near the hospital, of whom 7 developed rat-bite fever. Of these 65, 60% were babies under a year old, who were bitten while asleep.

Failure to isolate the streptobacillus more commonly has sometimes been attributed to its inability to grow in ordinary media, and the need for special techniques in its isolation. Wheeler claims that isolation is simpler than generally realised: the most important factor is a high concentration of protein in the culture, and he uses at least 8 c.cm. of blood to 50 c.cm. of broth.[5] The organism grows as characteristic cotton-wool balls. Its ease of isolation is borne out by Kane's experience; he grew it on four successive occasions on Loeffler slopes, and in 50% serum broth.

HOSPITALS AND HEALTH CENTRES

THE *Economist* of Aug. 18 endorses the plea made by the joint committee of the King's Fund and the Voluntary Hospitals Committee[6] for the retention of the small voluntary hospital. Atmosphere, the friendliness of the staff, and a feeling of security are attributes apparently intrinsic in the small unit and alien to the large one, and matter far more "to most patients" than "whether the medical or surgical treatment is the last word in efficiency." This type of argument, however, is full of fallacies. (If it is not, Heaven help the unfortunate patients who will enter in legions the portals of the 1000-bed teaching hospital, about which the same committee is equally enthusiastic.) The real answer surely is the one given by Gray and Topping in their survey of the hospital services of London. Whatever the terrors of the patient *before* he gets into hospital, once he is admitted his universe is not the 150 or 1000 beds of the hospital but the 20 or 30 beds of his ward, which is much the same in every kind of hospital. And the Really Important People are the sister and staff-nurse and the houseman or the resident medical officer, who are much the same whatever the size of the institution.

Our contemporary also applies this argument to health centres: the "dingy consulting-room of an old family practice," it points out, may be preferred by many a patient to the modern building with secretaries, clerks, card indexes, and other terrifying impedimenta of efficiency. And there is more substance in this application than in the original argument. If health centres are to house six or seven doctors and to have the advantages of clerical assistance and the like, there is real danger that patients may complain of a loss of privacy—indeed a blaze of publicity. It may even be that for a large group of patients the chief benefit of health-centre practice will be indirect, by the stimulus to professional efficiency which gregarious working conditions will engender in their medical attendant. The fact remains that medical clerks, whether in hospitals or health centres or tuberculosis dispensaries, are not given to betraying confidential information acquired in the course of their work: and once the patient has taken the plunge and got into the centre, the reality will probably prove far more pleasant than the anticipation. To other groups of patients, moreover, the benefits of the health centre will be more immediately apparent. The poorer quarters of every large town contain as the equivalent of the "dingy consulting-room" converted shops dignified by the name of surgery. Not much chance of privacy here, even if there is ample scope for verifying the *Economist's* statement that "the most efficient methods are not always the most effective." Ninety per cent of the population still have an income of less than £400 a year, and among the poorer sections of this substantial portion of the community there should be full opportunity for practical trial of the merits and demerits of all the health centres it will be possible to provide, by building or adapting, within the next ten years.

To the doctor, the advantages of team-work have been increasingly obvious for many years, with the result that private partnerships of two, three, and four doctors have become the rule. The health centre is a vehicle for team-work or it is nothing—unless it is a relief to the wife of the doctor who lives in the house with "the dingy consulting-room of an old family practice."

TOXICITY OF BORIC ACID

IT has long been realised that boron, if misused, may cause serious and even fatal intoxication. Since Dopfer[7] first recorded erythema and profound toxæmia in a child of 2 treated for a burn by application of 80 grammes of 10% boric acid during four days, a number of similar incidents have been reported. All agree as regards symptoms, which include vomiting, diarrhœa, and rapidly progressive prostration, with severe irritation of the central nervous system. Extensive exfoliative dermatitis may develop when the drug is given over a long period, and hæmorrhagic cystitis is not uncommon. Most cases have followed accidental ingestion of substantial quantities of boric acid or borax, but poisoning has been described in infants who have suckled from nipples cleansed with saturated boric-acid solution. In some of these cases it has been possible to estimate the amounts given, and it appears that the fatal dose of boric acid in an adult is somewhat more than 15–20 g., and in an infant 5–6 g.[8] It cannot be said that boric acid is very toxic to human beings, for Peyton and Green[9] record recovery after a subcutaneous injection of 28 g., while McIntyre and Burke[10] had a patient recover after 15 g. was given intravenously.

Animal experiments, too, indicate that boric acid is not very toxic. Pfeiffer, Hallman, and Gersh[11] find that the dosage which kills more than half a group of animals is above 1·2 and less than 3·45 g. per kg. body-weight. Dogs tolerated up to 2 g. per kg. orally and rather less than 1 g. per kg. subcutaneously. These, of course, are large doses, and they suggest that animals are more resistant than man to boric acid. Animal observations also assist in the elucidation of clinical features. Signs of acute intoxication include cyanosis, depression, ataxia, fall in body temperature, persistent vomiting, and meningism. Short convulsions may precede death. Blood changes in dogs are suggestive of "shock," with hæmoconcentration, a rising pulse-rate, increase in blood non-protein-nitrogen and potassium, and gradually increased phosphorus excretion in the urine. About 40% of the dose of boric acid is retained in the body for more than 48 hours, and daily excretion of small amounts goes on for some time. The chief pathological changes are renal and nervous; glomeruli and tubules undergo damage and nerve-cells of the cerebral cortex and spinal cord die off. Skin lesions are not uncommon, but the liver is unaffected.

4. Richter, C. F. *J. Amer. med. Assoc.* 1945, **128**, 324.
5. Wheeler incubated his blood-cultures in a "candle-jar." This is a simple device in which a small candle is lit inside a jar with a well-fitting lid, whereby a raised CO_2 concentration, with lowered oxygen tension, is achieved.
6. See *Lancet*, Sept. 15, pp. 342 and 345.
7. Dopfer, *Münch. med. Wschr.* 1905, **52**, 763.
8. McNally, W. D., Rust, C. A. *J. Amer. med. Ass.* 1928, **90**, 382.
9. Peyton, H. A., Green, D. *Sth med. J.* 1941, **34**, 1286.
10. McIntyre, A. R., Burke, J. C. *J. Pharm. exp. Ther.* 1937, **60**, 112.
11. Pfeiffer, C. C., Hallman, L. F., Gersh, I. *J. Amer. med. Ass.* 1945, **128**, 266.

Chronic boric-acid poisoning leads to remarkably little pathological disturbance, although the compound accumulates in the central nervous system—especially the grey matter of the spinal cord and cerebrum—the peripheral nerves, the liver, and the body fat, in that order. The blood-picture remains unaltered and the liver is but slightly affected. Growth of young animals is inhibited. Pfeiffer, Hallman, and Gersh show that disturbance of this kind may result from treatment of wounds with an ointment or when serous cavities are irrigated with 5% solutions of boric acid. Under these conditions, most of the compound is absorbed; and a simple calculation shows that in surgical practice quite large amounts of boric acid may be brought into contact with ideal absorbing surfaces.

The position, then, seems to be that boric acid has toxic properties, enhanced by its tendency to accumulate in the tissues. A long period (14 to 18 days) is needed for urinary excretion to reach a steady level: relatively little is excreted during the first 48 hours, and appreciable amounts persist in the brain and liver for as long as 4 days after stopping the daily dose; indeed boron may accumulate in the brain in amounts greater than in the treated wound. On the other hand both human and animal experience show that many grammes must be absorbed before the danger level is reached. Hence in attempting to arrive at a guiding principle for the treatment of wounds undue emphasis should not be placed upon results of accidental poisoning. So far, clinical evidence of ill effects after wound treatment is scanty; but there does appear to be some need for caution in the use of boric-acid irrigations, as is shown by the case described by Ross and Conway,[12] in which a child of 3, treated for empyema by continuous irrigation with 5% boric-acid solution, developed an extensive rash and signs of profound shock; the organs contained appreciable amounts of boron. As boric acid is only weakly antiseptic, it is worth considering whether a more effective and less potentially harmful agent should be substituted.

FOSTER HOMES FOR THE INSANE

THE value of family care for the mentally disordered is universally admitted, yet little attempt has been made in this country to find suitable foster homes for the purpose: in the family care of defectives much more has been achieved. In the State of New York the development of foster family care for the insane has been unusually successful because of the energy and forethought exercised in this uphill but rewarding work. Miss Crutcher, the director of social work in the New York department of mental hygiene, has written a book [13] which in its practical and restrained enthusiasm, and in its protocols of success, shows that she is in the tradition of those Victorian women who could make politicians and State agencies serve their idealist purposes. She points out that the therapeutic work of a mental hospital is hampered by the deadweight of patients who have no hope of full recovery but nonetheless require continuous care. Family care is a method of returning into the community those who have improved somewhat and are harmless, but whose own families could not take charge of them. Besides the advantage to the patient, it is an effective administrative procedure since it releases hospital space for patients who need active treatment and for patients who could not be allowed to live outside; it is less expensive than hospital maintenance, and a large proportion of the patients thus "placed out" make a lasting and happy adjustment to their surroundings. But these ends cannot be attained unless those responsible for psychiatric services also provide the means, which include the allocation of a considerable special fund on which the costs will be borne, and the employment of a number of skilled social workers who are responsible for selecting and supervising the foster families. In New York it has become plain that one social worker can supervise about 60 family-care cases, but if she has a heavier load than this there are more failures among the patients she places; they have to come back to the hospital, or another family has to be found for them. Miss Crutcher gives the exact budget that has been necessary, and she shows that, when every charge upon the scheme has been included, it saves more than 300 dollars a year for each patient thus dealt with. There is no danger, however, that such an accounting might lead local authorities to resort to family care under conditions in which it could become an unguarded or inhumane way of dealing with the chronic insane at a lesser expense.

Miss Crutcher's book shows that family care can be an important form of treatment. In psychiatry socialisation is a primary therapeutic measure; and the case-histories which she quotes demonstrate how much more beneficial life in a well-chosen foster family can be than life in a mental hospital, even for those who will never wholly recover their mental health. Throughout the book a spirit of respect for the individual is evident, though in the presentation of her theme she is studiously practical. It is certain that a mental hospital which utilises family care and has an adequate staff of social workers for the purpose, not only increases its power to benefit the patients but thereby reminds its staff constantly how artificial institutional life really is, and demands of them a constant readiness to work towards the goal of a more normal and satisfying environment for their mentally ill patients.

12. Ross, C. A., Conway, J. F. *Amer. J. Surg.* 1943, **60**, 386.
13. Foster Home Care for Mental Patients. Hester B. Crutcher. (Oxford University Press. Pp. 199. 11s. 6d.)

INJURIES OF THE RECTUM

THE obstinate tendency of the perianal tissues to form fistulæ is commented on although not explained by Blaisdell [14] in an article on traumatic injuries of the rectum. He points out that a penetrating wound in this area is potentially fistulous and that the best treatment is to saucerise it as much as the anatomy permits. This prevents the formation not only of a chronic fistula but of resultant deep infection which, owing to the inadequate path of escape, may be forced into various surrounding tissues and planes to give widespread and even fatal trouble. He condemns almost any suturing of such wounds, including suture of the anal sphincter, since this merely helps to bridge the superficial gap and so promotes the very conditon to be avoided. The same unsatisfactory result is favoured by the collapsed state of the tissues in the area, which he compares to "the closed position of an accordeon." The anal sphincter and the natural apposition of buttocks and thighs compel this collapse; yet even so he points out that other wounds with their edges in close apposition usually heal, even if infection is present; and there is no clear explanation why these fail to do so. He also condemns temporary colostomy on the score that the time-lag before it is effective is too great to prevent fistula formation; and certainly colostomy is no cure for a fistula once formed. It is not perhaps out of place to wonder in what category third-degree obstetric tears might be placed; for if carefully sutured and well nursed they heal without trouble.

14. Blaisdell, P. C. *J. Amer. med. Ass.* 1945, **128**, 559.

INCORPORATED SOCIETY OF CHIROPODISTS.—The autumn convention of the society will be held in London from Oct. 4 to Oct. 6. The lecturers will include Mr. N. C. Lake, FRCS, who on Thursday, the 4th, at 3 PM, will speak on posture with particular relation to the legs and feet, and Mr. T. T. Stamm, FRCS, who on Friday, Oct. 5, at 10.5 AM will discuss disabilities of the foot associated with the first metatarsal. Both these lectures will be given at the Royal College of Nursing, Henrietta Street, W1. On Saturday, the 6th, at 10.30 AM, at the Zoological Society, Regent's Park, NW, Prof. F. Wood Jones, FRCS, FRS, will deliver a lecture on the evolution of the foot. Further information may be had from the secretary of the society, 21, Cavendish Square, W1.

Special Articles

FILING OF ABSTRACTS AND CASE-RECORDS

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HILLINGDON COUNTY HOSPITAL

ATTENTION has been drawn to the application of a simple efficient punched card filing system for the recording and sorting of anæsthetic case-records.[1] This system has been used for some years in various special departments at Hillingdon County Hospital as a means of filing and cross-indexing medical abstracts.

A card is provided ruled on both sides and measuring 6 in. × 8 in. with room for about 400 words in writing.[2] Holes punched round the edge are marked with the numbers 1–57, two alphabets and an extra set of vowels (fig. 1). The holes can be cut into "Vs" with the simple instrument provided. If a long needle is passed through any particular numbered hole in a pack of cards symmetrically aligned, and the pack is then lifted, cards cut at this number will drop out. Thus a large number of cards can be rapidly sorted.

Reference codes for special subjects have been devised. As an example the code used when abstracting published work on anæsthetics is set out in full below. As a further example, the method employed for genito-urinary literature is to use one alphabet on the card to indicate broad anatomical groups—e.g., B for bladder, K for kidney, &c. The numbers refer to methods of investigation, cystoscopy, pyelogram, &c., to specific operations, nephrectomy, cystotomy, resection, &c., and miscellaneous features, various symptoms, prognosis, antiseptics, &c. An ample supply of letters and numbers on the cards allows of the construction of a classification to suit individual interest on any subject.

THE SYSTEM IN USE

The title and reference are written on the top of the card. The first letter of the first author's name (if there is more than one author) is marked on one alphabet, to facilitate location when only a reference is given. After the abstract of the article has been written the appropriate letters and numbers relating to the subject matter are marked. The V-cutting can be done at some convenient later date.

Examples from the anæsthetic code—

1. Experimental studies dealing with the action of various drugs—e.g., 'Pentothal' and cyclopropane—on the stomach would be marked: 10, 16, B, L, extra vowel A.
2. Spinal anæsthesia, sequelæ affecting the nervous system = 36, A, extra vowel I, and drugs concerned also marked.

Cards of special present interest can be simply collected together, or alternatively grouped under one of the remaining unused letters P–Z. Articles of great interest and available in the original, but too long to be abstracted satisfactorily in the space provided, can be recorded as a reference only, and the code numbers of the subject matter cut in the usual way.

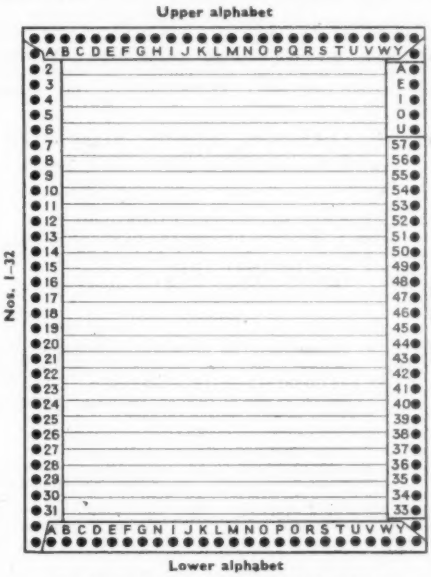

Fig. 1.—Card used for filing medical abstracts.

Similar cards are used for keeping a private record of interesting cases which have been treated to a conclusion. One alphabet is used for patients' names, the other for various organs. The numbers refer to pathological conditions, operative procedures, investigations, &c. Thus it takes but a few moments to get out, for example, all cases of peptic ulcer for which partial gastrectomy was performed, the type of operation performed and the end-result, or all cases of prostatectomy done in two stages and the percentage of such cases admitted with retention (fig. 2).

There are many advantages in being able to use one's own code, but it is wise to accumulate a considerable number of cards before a final arrangement of code numbers is adopted.

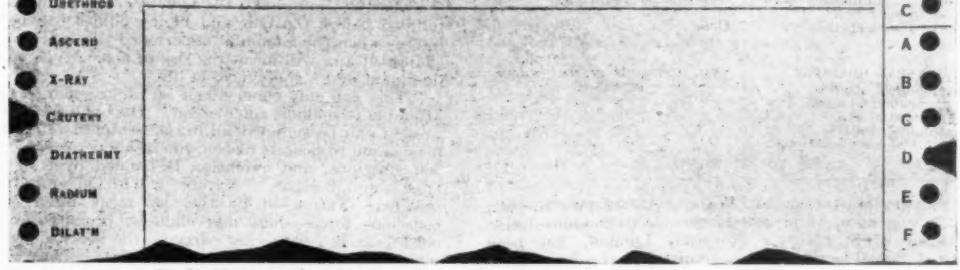

Fig. 2.—Upper portion of card used for genito-urinary cases, showing specimen Vs cut.

1. Nosworthy, M. D. *Brit. J. Anæsth.* 1943, **18**, 160. See *Lancet*, 1943, ii, 50.
2. The Copeland-Chatterson Paramount Card. Obtainable from Copeland-Chatterson Co. Ltd., Stroud, Glos.

The possibilities of this system will be apparent to the student of medical literature and to those concerned with keeping private case-records. It may appeal especially to those deprived of easy access to large libraries and the *Index Medicus*, and to those who cannot enjoy the advantages provided by the more complicated cross-reference systems (e.g., Hollerith) available in but a few of the larger centres. Perhaps the chief attractions are the opportunity for simple yet comprehansive cross-indexing and the facilities offered for ready reference to matters of particularly personal interest. Thus the specimen "anæsthetic code" appended was designed for the personal use of an anæsthetist in relation to his own particular interests. It is probably not comprehensive.

ANÆSTHETIC LITERATURE: SPECIMEN REFERENCE CODE

I. HYPNOTICS, ANÆSTHETICS, ANALGESICS, ETC.

Liquids

1. Ether.
2. Chloroform.
3. Ethyl chloride.
4. Divinyl ether.
5. Trichlorethylene.
6. Others (e.g., paraldehyde, alcohol, cyclopropyl ethyl ether, &c.).
7, 8.

Gases

9. Nitrous oxide.
10. Cyclopropane.
11. Other (e.g., ethylene, propylene, &c.).
12, 13.

Solids

14. Opiates.
15. Bromethol.
16. Ultra-short-acting barbiturates.
17. Other barbiturates.
18. Other (e.g., chloral hydrate, &c.).
19, 20.

Local Agents

21. Cocaine, procaine, 'Nupercaine,' amethocaine, amylocaine, and their synonyms.
22. Others (e.g., 'Metycaine,' &c.)
23.

Other Substances of Importance

24. Oxygen (including oxygen lack, anoxia, &c.).
25. Carbon dioxide (including CO_2 absorption, acapnia, &c.).
26. Inert gases.
27. Analeptics, BP-raising drugs, vasoconstrictors.
28. Atropine group.
29. Others (e.g., curare, magnesium sulphate, &c.).
30, 31.

II. METHODS AND TECHNIQUES

32. Intratracheal.
33. Other inhalation methods (CO_2 absorption no. 25).
34. Rectal.
35. Intravenous.
36. Subarachnoid.
37. Extradural, peridural, splanchnic.
38. Other regional methods.
39. Infiltration.
40. Surface application.
41. Other methods (e.g., refrigeration, electricity, &c.).
42.

III. SPECIAL CATEGORIES

43. Shock.
44. Toxicity, impurity, idiosyncrasy.
45. Transfusion.
46. Resuscitation, fatalities, emergencies.
47. Explosions.
48. Convulsions.
49. Apparatus and appliances.
50. Analgesia.
51. Preparation, premedication, basal anæsthesia.
52. Choice, assessment of risk.
53. Therapeutic and diagnostic use.
54. Children and newborn.
55. Historical, general articles, organisation, teaching.
56. Other (e.g., signs of anæsthesia).
57.

IV. SYSTEMS (*lower alphabet*)

A. Nervous.
B. Digestive (dental, oral, and abdominal surgery included).
C. Respiratory (thoracic, and nose and throat surgery included).
D. Generative (obstetric).
E. Urinary (GU surgery).
F. Circulatory.
G. Metabolism. Endocrine.
H. Locomotor and skin (orthopædic, "traumatic," and plastic surgery).
I. Blood. Blood-chemistry.
J.

V. GENERAL HEADINGS

K. Physiological studies.
L. Pharmacological studies.
M. Chemical studies.
N. Anatomical studies.
O. Theoretical considerations.

P–Z for special use.

VI. EXTRA VOWELS

A = Action of drugs on systems. Condition of systems during anæsthesia or operation.

E = Condition of systems before anæsthesia or operation.

I = Condition of systems after anæsthesia or operation.

O = Site of operation.

U =

VII. AUTHOR'S NAME (*upper alphabet*)

UNIVERSITY COLLEGE OF WALES, ABERYSTWYTH.—Mr. W. C. Evans, PH D, at present biochemist to the inoculation department of St. Mary's Hospital, London, has been appointed special lecturer in biochemistry in the department of animal health at the college.

In England Now

A Running Commentary by Peripatetic Correspondents

I GATHER that the physicists concerned with research into atomic structure see little danger that the knowledge gained may be used in such a way as to detonate our planet. No doubt there are good reasons, beyond the understanding of those without special knowledge, for their confidence. Nevertheless, I feel that we should be paying more attention to such eventualities, as well as to possible aberrations of the scientific workers—the human part of humanity's recording and interpreting apparatus.

The effort to escape responsibility is one of the most prominent features of human nature, and it is not to be expected that physicists are essentially different from all other human beings in this respect; throughout recorded history technicians have been glad to use the facilities afforded by rulers to follow their calling, without responsible concern as to the way in which the fruits of their labour may be employed. So we can say with confidence that *if in fact* we were on the eve of a discovery which, used as it would be used in existing conditions, would lead inevitably to the destruction of the world, the normal reaction of a scientist who had a glimpse of the possibility would be to say to himself:

> "This is absurd. I'm getting rattled. How could the world come to an end? I'm just an honest scientific worker doing a most exciting job of work, and my countrymen are relying upon me to get on with it. I shall be letting them down if I allow myself to get neurotic about it. After all, I'm only one of a team, and my business is to discover the truth. The use that other people may make of it is none of my business."

And that is probably very like what some at least of the atom-splitters have been saying to themselves lately. It is unlikely that any sane man is capable of believing fully that our world could come to a sudden end as the direct result of a simple discovery, made by himself in the ordinary course of his work; or indeed that it could come to an end in the near future by any means whatsoever; and such a disability to believe, being of emotional origin and supported by the similar attitude of his colleagues, would be very little influenced by the actual presence and logical evidence of danger.

One may at least hope that a committee of physicists, not themselves directly concerned with atomic research, has been set up to advise the Government continuously on the possibility of such risks arising as research proceeds, and that the public, better balanced emotionally than those specialised either for research or administration, will be kept continuously informed of its findings.

But even if man is still free for a while from direct responsibility for the preservation of his planet, he cannot any longer evade responsibility for the future of life upon its surface, and we do not need the report of any committee to tell us that this is in peril. It is, after all, life that concerns us, and the sudden explosion of our planet would be no more than a merciful and timely end if the evolution of life upon its surface had ceased its upward striving, and had no possibility before it but slow disintegration and degradation. It is some years since Julian Huxley wrote:

> "When civilisations and societies are organised so that their prime purpose is the pursuit of spiritual values, then life will have passed another critical point in its evolution; as always, what has gone before is necessary as foundation for what is coming, and the biological conditions must be fulfilled before the new and higher edifice can be built; but, as when the mammals superseded the reptiles, so this change of aim will mean the rise of a new type to be the dominant and highest form of life.
>
> "This can only come about so far as man consciously attempts to make it come about. His evolution up to the present can be summed up in one sentence—that, though his coming to possess reason, life in his person has become self-conscious, and evolution is handed over to him as trustee and director. 'Nature' will no longer do the work unaided. Nature—if by that we mean blind and non-conscious forces—has, marvellously, produced man and consciousness; they must carry on the task to new results which she alone can never reach."

Essays of a Biologist, Pelican edition, p. 10.

Since then events have occurred which some may interpret as a prelude to the regression of evolution, and the atomic bomb has arrived to bring the danger home to us. It is clearly high time for those who, having some interest in biology, are really concerned for the future of life on the earth, to get together. Unless we use ourselves for the creation of a higher living organism, we shall expend our creative ingenuity in the service of the mechanically inspired forces of mutual destruction.

Personally, I believe that the new biological entity with which the hope of the future lies is a consciously created multimental organism; but that is another story.

* * *

The soldier's return! I'm all complete except for the barrel-organ. However carefully one trains oneself to expect the difficulties, it isn't the same thing. The other night I was bawled at by a little man in the seediest bowler hat I have ever seen. It shone like an engine-driver's cap, and his complaint was that I brought my car in at 4 PM, and said I might have to take it out again at 7. "I can't do with you running in and out. I've got three lorries to get in yet. I'm sick of it, that's what I am." That is the answer really. From the garage I went to the butcher's queue, to the milkman who can't spare me any milk, to the laundry who can't take on new people, to the shoemaker's who can't do any more repairs, and to the cleaner's who can't save my coupons by dyeing my khaki. They want doctors, but not apparently in Harley Street: rents are doubled and rooms can't be shared.

Was it all worth while? The boredom, the irritation of incompetent direction, and obsessional blocking of projects by red-tape (a much heavier burden this than blood and tears)? It was. To have shared, with men and women in the Services, the odd frustrations and occasional terrors of war, was an incomparably rich experience. To have seen the sun setting off the North African coast, lighting the craziest vessels riding in placid waters like mother-of-pearl, under a blue and apricot sky; or the cool of evening after a sticky day, with flocks of green parakeets fussing about their bedding down, tumbling in and out of very green trees, with the wall of Himalayas blue and solid behind them; early morning clouds in the monsoon; and the oily flop of tepid grey sea in the Persian Gulf, with the squat white buildings of Bahrein shimmering in the glazed heat—these make the background of an experience which could have been gained in no other way. I have shared the misery of uncertainty and delay, and have myself impassively frustrated the endless ways in which men try to hurry their return to civvy street. The bewildered POW ashamed of his emotional outbursts, the sterling ATS sergeant whose figure is her misfortune, the tough NCOs who like to plague the young soldier with irritating orders—what remarkable variety of human sublimity and nonsense!

Worth it? I should say so, whatever the rude civilians do to us. Excuse me, is this the queue for the barrel-organs? Thank you, brother, for directing me further down the line.

* * *

The Irish have a word for a patient who is not doing so well: "He has disimproved," they say. Nothing could more gently hint at sanguine hopes gone wrong. Disimproved is just the word for transport in London in my day. In my early childhood we had horse-buses in variegated colours; and the genial and winking old men in rugs, who held the reins, would pull up the team for any waving hand. Then we had motor-buses, which, if less reliable than horseflesh, were at least as willing to stop for the convenience of others as for their own. After that things disimproved rapidly. Buses became more trustworthy but less accommodating: they would only pull up at given spots, though these, fortunately, coincided with the exits of the Underground. Those buses bore large numbers back and front, and also on the sides, so that if you were coming up a side-street you could see what bus routes crossed the top of it. Each bus carried an informative headboard, giving the main points on the route, and those of us with good eyesight were saved a peck of time and trouble. Acceleration was poor, so that you could be sure of stepping on comfortably while the driver was changing out of bottom. Underground it was just as pleasant—there were brisk lifts to swing you up and down, and jolly liftmen: well, most of them were jolly. But now all that is changed. Buses have a conspiracy of silence about where they are going. Their headboards give meagre notice of a final destination, their numbers are small, and no longer to be seen on the sides (sometimes not even on the back), the stopping-places are arranged to give us as long a walk as possible from the Underground, there is seldom any information about routes on the posts where we queue up—only numbers—and acceleration is much too good. The final insult is the new bus whose automatic doors, shutting smugly in your face, were designed after careful thought to sour the liberal heart and make the traveller stamp, and look, like the wild ass. Apart from everything else, bus-drivers, once a sort of knights-errant who snatched old ladies from the gutter and wafted school-children home, are now a changed race: intolerant of any interruption they pause chafing at fare stages, ignore request stops, and shake off the last clinging ants from their vessel's stern as they spring away on their secret journeys. Underground we plod through endless tunnels or stand wedged on moving stairways like bottles on a factory belt. If we get into one of the few remaining lifts, a patronising voice from heaven, possibly St. Peter's, adjures us to "Stand clear . . . of the gates." Thanks to all these disimprovements I can no longer say, as I used to do in childhood, that to get to any point in London from any other point takes three-quarters of an hour: I now reckon on an hour and a lost temper. That's progress.

* * *

We are all on tiptoe at the moment expecting our prisoners in from Siam. The Americans beat us to it again and got some of theirs out the day before the Nip envoys got in here—apparently without any trouble at all. And some of our pilots flying over there have seen them waving outside the cages. A great whip-round is going on for comforts for them—clothes, cigarettes, &c.—and everyone will be all out to give them a real welcome on rather limited resources.

The morale of our chaps is good, and they are very reasonable in realising that their demobilisation will take a little time to organise and that ships don't grow on trees. There is, very naturally I think, a feeling that the game is over and that the rest of their job is just a matter of holding the fort until the Regulars come along to take over from them. But it will help to pass the time if we see new places. Malay, Java, Borneo, &c. (they all hope Bali, of course, where the girls are "wondrous fair to behold," they hear). Good luck to them, anyhow: they deserve a break.

* * *

It is not possible to remove "class" by mere legislation. Benefits at first limited to the few become in time available to the many; mass production of what-you-will places the luxuries of the rich within reach of all. In one way or another we all try "to keep up with the Joneses." My observation is that the Joneses decline to be kept up with. Consider plus-fours: at first confined to the golfers, they soon appeared on the limbs of errand-boys; whereupon the golfers retaliated by reverting to flannel bags. An *Evening News* cartoon depicts two miners discussing how they will fare when mines are nationalised; as civil servants, of course, they will work in bowler and striped trousers. But as fast as the workman discards his corduroys the public school-boy's parent realises their hard-wearing qualities and dresses his son accordingly. When ownership of a sports car was held vulgar, and when a two-seater implied inability to afford a closed car, the moneyed man drove in his saloon. Now that everyone owns imposing saloons, it is the dernier-cri to own a sports car and breathe fresh air again. Maids and shop assistants have elaborate "white weddings," while doctors get married unobtrusively in the course of the morning round. And everybody now has "letters" after his name;" I bought some hens this week and found my vendor was a Fellow! Yes. FSPBR. So the next move lies with us—a small plate (large visiting-card size) and a simple "Dr. Jones."

* * *

There is much to be said for the acarus. She keeps one up to scratch.

Letters to the Editor

VITAMIN-B DEFICIENCY AND NERVOUS DISEASE

SIR,—In the interesting leader in your issue of Sept. 8 the conception of a "biochemical" as opposed to a "histologically demonstrable" lesion is developed, and the reader might not unreasonably infer that this conception provides the complete solution of the problems involved in the pathogenesis of polyneuritis in general and of beriberi in particular.

Nevertheless, the physician familiar with the clinical and pathological phenomena common to all ætiological varieties of polyneuritis will appreciate that between these phenomena and the proposed "biochemical lesion" there is a complete gap in our knowledge that this conception does nothing to fill.

It may well be that thiamine is a catalyst in the absence of which nerve-cell metabolism in the brain breaks down at the stage of pyruvic-acid formation, that this substance then accumulates, and that in these circumstances there may be a failure to develop the full energy of carbohydrate which impairs the functions of the cells in question.

Of the three items of this hypothesis, the first two cannot accurately be called novel, while the last is purely speculative. The notion of a breakdown in carbohydrate metabolism, when carbohydrates are taken without a due proportion of vitamin, is clearly implicit in the work of Braddon and Cooper; Funk, and other investigators of the period immediately preceding 1914, and summarising this evidence many years ago (*Quart. J. Med.* 1918, **11**, 320.) I ventured to suggest that some intermediate product of this arrested metabolism might be toxic for the nervous system, and thus act as the immediate factor in the development of beriberi. It is only within the past decade that modern biochemists have tardily returned to this early conception—in part, but without proceeding to ask whether the pyruvate that is reported to be present in excess in the blood and cerebrospinal fluid of beriberi patients may not be the toxic metabolite in question. But however this may be, the "biochemical lesion" as postulated in your article is clearly inadequate to account for the fact that the signs and symptoms of beriberi, as of other ætiological varieties of polyneuritis, do not point to the nerve-cells of the brain as the seat of the relevant disorder of function, but point unequivocally to the peripheral nerve-fibres, that when lesions are histologically evident these also are predominant in these nerves, and that whatever the functional activity of nerve-cells in the brain, this is not reflected in the clinical picture as an integral part of it.

Something more is required to connect these two wholly disparate findings: the biochemical lesion in the brain on the one hand and the clinical signs and the lesions in peripheral nerves on the other, and until this "something more" has been found we cannot regard the problem of polyneuritis as solved.

It is not correct to say, therefore, that "we can easily explain" the occurrence of polyneuritis in the acute fevers, pregnancy, thyrotoxicosis, and alcoholism. Indeed, there is no conclusive evidence that there is a polyneuritis of thyrotoxicosis, while the rare polyneuritis of pregnancy is a product of so many obscure factors that we may not even say that it is related to pregnancy per se.

Brilliant as it is, the history of modern biochemistry reveals a persistent tendency to oversimplify the problems of polyneuritis, a very imperfect understanding of the many aspects of this malady, and a lack of historical sense which is seen as a disregard of the brilliant researches of the early workers prior to 1914 with a failure to appreciate the valuable lessons their work reveals.

The truth surely is that to tackle the problems of polyneuritis with reasonable hope of success demands a comprehensive understanding of all its aspects, for we cannot expect to elucidate the factors operative in the production of a human disease without a sound grasp of its natural history, its forms and variations and its pathology, and some competence to view all these on the general background of neuropathology. No-one, today, can claim to have experience of the full range of the clinical and pathological manifestations of beriberi. Our only source of complete information is the vivid and complete account given by Hamilton Wright over forty years ago (*Stud. Inst. med. Res. F.M.S.* 1903, **3**). I submit that no-one unfamiliar either with the disease or with this unequalled description can pretend to understand this illness. Divorced from this essential information, animal experiments inevitably wander from the realities of the problem they seek to solve.

There is nothing new or revolutionary in this point of view. It has been cogently urged upon us by Sir Thomas Lewis and Mr. Wilfred Trotter in their pleas for a clinical science which shall attack medical problems by all necessary methods, clinical and experimental, and is to be pursued by workers ready and able to assess the whole field of relevant evidence.

There could not be a problem calling more urgently for this comprehensive attack than that provided by polyneuritis. Only in this way shall we escape the departmentalism of thought and effort that has for so long kept us back from the successful elucidation of the pathogenesis of all forms of polyneuritis. Genius and industry have not been wanting in the attack upon the problem, but it cannot be denied that broadness of view and integration of thought and effort have not been present. That this is so, a historical survey of the history of beriberi research from the beginning makes only too clear.

One other comment upon the leader may be permitted. There seems implicit in it the assumption that in thiamine we have a potent and reliable remedy for polyneuritis, even though in chronic cases the results may not be so "spectacular" owing to the presence of structural lesions that require time to heal. It would be difficult to give a more misleading picture of the therapeutic situation. Though I have sought it for over twenty years, I have yet to see the case of polyneuritis, acute or chronic, that gave a clear and striking response to the administration of the vitamin-B-complex or to thiamine, in whatever dosage and by whatever channel. In what we call febrile polyneuritis the ineffectiveness of these substances is quite painfully obvious, while I have never seen the severity or duration of a case of alcoholic polyneuritis mitigated by them. This, surely, is the common experience of those who like evidence upon which to base conclusions. In a controlled study of over 200 cases of polyneuritis in the Boston City Hospital, Brown (*J. Amer. med. Ass.* 1941, **116**, 1615) reports that thiamine administration was found to have no influence upon the behaviour or course of the malady. If, indeed, there be any conclusive evidence in a contrary sense, it is high time it was marshalled, and the medical profession presented with a body of documented and controlled observation, provided by workers in whose capacity to assess the progress of an organic nervous disease, and its response to treatment, we may have confidence.

London, W1. F. M. R. WALSHE.

INDEPENDENT RESEARCH

SIR,—Stimulated by your leader and Prof. F. W. Twort's admirable letter, I put forward the following considerations. In my view there are two grades of research: (1) the initiation of some original and fertile conception; and (2) the elaboration of the processes required to make the new conception of practical value to man. Examples of class (1) are Becquerel's discovery that electromagnetic waves emerge from pitchblende; Manson's hypothesis that malaria was insect-borne; and Fleming's observation that the presence of a mould inhibited the growth of a coccal culture. The genius who evolves such a conception is almost always an independent worker, untrammelled by superior control, though rarely he may be a member of some team.

Once the great and original idea is enunciated, then comes the value and the need of team-work. Thus the Curies and others elaborated Becquerel's discovery; Ross worked out Manson's idea; and Florey and his co-workers brought Fleming's original observation to fruition. Like Twort, I think excessive control will militate against class (1) research. No team of horses linked together could ever win the Derby.

I have known of one who began research as a labour of love, and working freely and unpaid, with facilities

wisely granted by a far-seeing institute director, made discovery after discovery. Unfortunately his circumstances altered, and he required financial aid from a public research fund. At first this was granted freely and without control, and did not seriously impede him. But later on, when a scientific committee assumed control over his researches, his originality was hampered, and it faded and failed. The committee was an excellent one, most anxious to safeguard public funds; but the glamour was gone—the poet could write no more odes, the composer heard no more melodies.

Can we not foster *both* grades of researchers—the individuals as well as the teamsters?

Stocking Pelham, Herts. THOMAS LUMSDEN.

THE PERFECT AP

SIR,—Dr. George Day in his article of Sept. 8 states that twenty years ago nobody bothered to explain how an artificial pneumothorax worked. That it does work in certain cases is now well known, but precisely how it works is still not clearly understood. What we can do at the present time is to observe when an AP works and when it does not work, and so establish definite indications and contra-indications for its use. It is only when all these facts are known that we shall be able to deduce the mechanics of the AP with any certainty.

We consider that the Perfect or Ideal AP is the AP with no restraining adhesions in which there is no tension exerted by respiratory "pull" through any portion of the lung, but Dr. Day's contention that a diseased lobe retracts into the position best suited to its healing is a teleological explanation which we cannot accept.

We regret the use of the word "immobilise" in the statement that a Perfect AP immobilises the diseased zone of lung tissue, as if the air were acting as a plaster to "splint" a fractured limb. An AP does, however, minimise movement of the affected lobe, thereby resting the diseased area as much as possible.

When screening a patient who has an AP with no adhesions it is commonly observed that the diseased lobe moves but slightly, whereas the healthy lobe or lobes perform a wide respiratory excursion; but the statement that the healthy lobe performs the breathing of the entire hemithorax must be untrue. It is well known, for instance, that when a closed internal pneumonolysis is being performed on a patient with a simultaneous bilateral AP such a patient is liable to be more distressed than one in whom the disease is unilateral.

The "contraselective" AP, as shown in fig. 3, with the diseased lobe adherent to the chest wall through pleural symphysis, is to be condemned, except in exceptional circumstances. Those patients who have such an AP which is still continued are those in whom the great majority of serious pleural complications arise, and an early favourable result does not necessarily mean permanent control and arrest of the disease. There are, of course, some cases in which an AP cannot be regarded as effective and in which thoracoplasty is contra-indicated. In a few of these cases where there are dense adhesions over the diseased lobe which do not permit of adhesion section the AP may be continued until such time as a thoracoplasty is practicable. This is done at the serious risk of potential complications, such as an effusion which may become an empyema, unexpandable lung, and marked mediastinal distortion, which may develop during a prolonged imperfect AP.

The "striking clinical improvement" given by Dr. Day as a reason for continuing with an ineffective AP may not in actual fact be due to this AP. In the majority of cases bed-rest accompanies collapse therapy, so there is no certain way of knowing whether "clinical improvement" is due to sanatorium bed-rest or to the partial AP which does not relax the diseased area. By and large, imperfect APs do far more harm than good. We are quick to recognise the good, but do we recall the harm in assessing which APs to maintain and which to discontinue?

Symptomatic improvement alone should rarely be considered justification for continuing an otherwise ineffective AP, for it generally is impossible to determine whether the AP or bed-rest has produced the improvement. Furthermore, any improvement of this sort is temporary, and unless other treatment is employed a large percentage of these patients will eventually die of their disease. It must never be forgotten that empyema may be a relatively late complication.

Dr. Day's disquisition on how the Perfect AP works is of great interest in itself, and it is not to discredit his provocative article that we conclude this letter with a reminder that such Perfect APs represent only a small proportion of all cases from which they are derived. J. S. Whitney, reporting to the National Tuberculosis Association in 1938, stated that of all patients treated in 75 representative sanatoriums in 1933 more than two-thirds had no surgical treatment, and only 18% had a unilateral pneumothorax. Amongst the medical and nursing professions, where minimal lesions are detected by routine radiography, Perfect APs may be common; but they must be regarded as a specially selected group from which no deductions can be drawn as to the problem in the general population. But let us hope that with the introduction of mass miniature radiography on a nation-wide scale the percentage of early cases found will become even greater and the number of Perfect APs correspondingly increased. In other words, early diagnosis and prompt treatment must be the aim of our future medical services until such time as the disease can be prevented.

G. R. W. N. LUNTZ.,
S. M. HILTON,
Medical Officers.

British Legion Sanatorium,
Preston Hall, nr. Maidstone.

DEMOBILISATION OF MEDICAL STUDENTS

SIR,—When theological students and special categories of arts students are being demobilised under class B, it is surprising, to say the least, that no arrangements have been made for priority demobilisation of medical students who surrendered their reserved status voluntarily in the early stages of the war and joined the fighting Services, especially in the dark days of 1940 and 1941. These young men had begun their medical training before the outbreak of war, and might have continued quietly with their medical studies had they not felt strongly the temporary call to combative service at a critical period of their country's fortunes.

One is told that the case of these medical students is similar to that of other students. Such is obviously *not* the truth. They are a small group, deserving special consideration for the sake of the profession as well as in recognition of their own patriotic zeal.

London, W1. WILLIAM BROWN.

AGAR FOR LOCAL PENICILLIN THERAPY

SIR,—In their paper of June 9 (p. 720), Coles, Barker, Robertson, and Cowan described a method for the preparation of 'Penagar' and claim various advantages for it. While their criticism of our original penicillin agar is no doubt correct, it is to be regretted that they were not familiar with later papers (Modifications in Penicillin Agar Production, by Roberts, Murphy, and Jones, *J. med. Ass. Eire*, October, 1944, p. 41; Penicillin in the Treatment of Breast Abscess, by O'Hanlon and MacClancy, *Ibid*, p. 43). These papers give an account of a method for the production of 'Pen-Agar' which permits the penicillin content to be controlled, and which is considered superior from the operational point of view. It has been in continuous use since November, 1944, in the laboratories of a Dublin firm of manufacturing chemists.

It is interesting to see that Coles et al. confirm these earlier results—e.g., refrigerator life of penagar, rapid diffusion of penicillin, rapid healing if the organisms are penicillin-sensitive, and the necessity for "one dose per bottle"—in our case a standard of 20 c.cm.

University College,
Dublin. OLIVER ROBERTS.

SIR,—While in no way criticising the interesting work of Coles and his colleagues, we feel it necessary to point out that 'Pen-Agar' is a term used by us to describe an identical product which has been manufactured by us since November, 1944, under Licence no. 72, Therapeutic Substances Act. Pen-Agar, since its introduction to the medical profession in this country, has been advertised in the Irish medical and pharmaceutical press.

Bachelor's Walk,
Dublin. P. C. CAHILL & CO. LTD.

RENAL ANOXIA OR HYPERSENSITIVITY?

SIR,—Professor Maegraith and his co-workers perform a valuable service in emphasising the clinical and pathological unity of a group of conditions of widely different ætiology, all characterised by renal changes, which they call the "renal anoxia syndrome" (*Lancet*, Sept. 8, p. 293). But renal anoxia may be only the proximate cause of the tissue change, and the emphasis they place on it may obscure the fact that many of the conditions have a characteristic generalised morphology suggesting a common pathogenesis. In brief, they show vascular lesions, varying from œdema of the intima and media to a necrotising arteriolitis and phlebitis, associated with an interstitial œdema, exudation of erythrocytes, and infiltration with basophil macrophages, lymphocytes, plasma cells and occasionally eosinophils. In the liver there is a separation of the endothelium of the sinusoids from the liver cells, and in severe cases fragmentation of the liver cords, with areas of focal necrosis and a periportal cellular infiltrate. In the kidney there is a slight proliferation of Bowman's capsule, focal tubular degeneration with pigmented casts, and an interstitial cellular infiltration. The spleen and lymph-nodes show a histiocytic proliferation with areas of necrosis. Interstitial changes in other organs result in interstitial myocarditis, pneumonitis, pancreatitis, &c.

E. Clark and B. I. Kaplan were among the first to describe these morphological lesions in human serum-sickness (*Arch. Path.* 1937, **24**, 458), and A. R. Rich observed them in association with periarteritis nodosa both in patients receiving serum treatment for pneumonia and in fatal sulphonamide reactions (*Bull. Johns Hopk. Hosp.* 1942, **71**, 123 and 375). B. Black-Schaffer gave a detailed description of these generalised tissue changes in fatal sulphonamide reactions, and provided ample evidence that they are consequent on a generalised tissue hypersensitivity to a protein-conjugated sulphonamide with antigenic properties (*Arch. Path.* 1945, **39**, 301).

The incompatible blood-transfusion reaction is clearly a hypersensitivity phenomenon with an antibody reaction to a foreign antigen.

In the infective group a detailed analysis of the lesions in scrub typhus and allied rickettsioses by A. C. Allen and S. Spitz (*Amer. J. Path.* 1945, **21**, 603) reveals that the lesions resemble those described above. On the bases of these characteristic tissue changes these workers emphasise the importance of "an indirect, possibly toxic, but more probably hyperergic effect of the Rickettsiæ on the tissues." In Weil's disease and yellow fever, hepatic and renal lesions with focal necrosis and an interstitial exudate are the rule. Recently cases of gas-gangrene surviving the initial "toxæmia" succumbed later with the "renal anoxia syndrome" and the same generalised histological picture. It should be noted that in both Weil's disease and gas-gangrene there is extensive muscle destruction.

Although the interpretation of histological changes in terms of allergy must arouse considerable scepticism, it nevertheless seems reasonable to suggest that in the crush syndrome, and in anuria following burns and retroplacental hæmorrhage, in which similar generalised tissue changes occur, some product of tissue destruction, either alone or conjugated with protein, may behave as an antigen and incite a hypersensitive tissue reaction.

Maegraith includes in his review the renal changes in alkalosis and pernicious anæmia. Although these conditions are associated with renal anoxia, their clinical and morphological features are very different from those observed in other conditions showing the "renal anoxia syndrome."—The case of alkalosis described by N. G. B. McLetchie (*J. Path. Bact.* 1943, **55**, 17), showing lesions reputedly similar to those of the crush syndrome, was not entirely convincing.

If it be assumed as a hypothesis that the tissue changes in this group result from the fixation of an antibody in the tissue, and in certain individuals a hypersensitive reaction between this fixed antibody and a circulating antigen, then the members of the whole group fall naturally into a number of subdivisions:—

(1) Organismal antigen: rickettsial infections, yellow fever.
(2) Infections associated with antigens derived from products of tissue destruction: Weil's disease, gas-gangrene, septic abortion, and possibly blackwater fever.
(3) Antigens derived from chemical compounds conjugated to serum proteins: sulphonamides, &c.
(4) Antigens of the blood-groups: ABO and Rh transfusion reactions.
(5) Antigens derived from the products of tissue breakdown: traumatic uræmia, retroplacental hæmorrhage, and burns.

It is natural that the clinical features of these various groups should be far from uniform, for the earlier manifestations of such diverse conditions will be modified profoundly by the direct effects of the different causal agents (e.g., bacterial exotoxin). The renal lesion of the "renal anoxia syndrome" may, however, be the local expression of a generalised hypersensitive tissue reaction of the immune-body type. The fact that in some cases the preponderant lesion is renal has so concentrated attention on the kidney that the fundamental character of the reaction has been overlooked.

Such a concept may offer a rational explanation of the erratic occurrence of the syndrome in individuals exposed to the same ætiological factors, and also suggest a new therapeutic approach to a symptom-complex of grave prognosis.

Department of Pathology, Radcliffe Infirmary, Oxford. ROSEMARY BIGGS.

BANTING MEMORIAL DIABETIC CONVALESCENT HOME

SIR,—The debt of life and health that the diabetic world owes to Banting's discovery of insulin is beyond words, and diabetics in this country want to recognise it adequately by a practical memorial. The Diabetic Association, a combination of lay patients and interested doctors, is planning to honour his memory by establishing a convalescent home, badly needed but so far non-existent, where diabetics leaving hospitals after acute treatment can be fully restored to normal health by proper diet, insulin, and diabetic training. It will serve, too, as a holiday home for diabetic children.

This home must be started by voluntary effort. We have already collected £8000, but we aim at a worthy memorial and need £50,000. The people whose pleasure and duty it is to provide this money are obviously diabetics, especially the rich, who know the blessings of insulin for themselves or loved members of their families. It is difficult for us to get in touch with them, and there could be no better means of contact than the doctors who treat diabetics. We therefore beg such doctors to acquaint their diabetic patients of this memorial scheme to Banting and to urge them to support it handsomely. Subscribers should communicate with our Association, at 9 Manchester Square, London, W1.

R. D. LAWRENCE.
Chairman, Diabetic Association.

DOMESTIC STAFF IN HOSPITAL

SIR,—As a ward sister I felt I must write to say how much I and my colleagues agree with the view that shortage of domestic staff is indirectly the cause of the shortage of nurses.

In the hospital from which I have recently resigned, the nursing staff were resigning at the rate of 10–12 a month. The main grievance of student nurses was that they found the work too hard—not because they had to do too much nursing, but because they had most of the domestic work to do, and had to skimp their nursing treatment. They never had time to stop to see any treatment a doctor might be doing, and had no hope of giving patients any individual attention. They came off duty late and dissatisfied, too tired to study or even relax. More ward sisters left this hospital in 6 months than I have seen leave other hospitals over several years, again because of the acute shortage of domestic staff. A ward sister with a ward of 30 patients and a maximum staff of 3 nurses, and—if she is very lucky—a staff-nurse, would have to wash up the patients' breakfast crockery when she came on duty in the morning. This was one of many domestic jobs that fell to her, because hardly a ward in the hospital had its quota of domestic staff. And of course her own work could not be neglected. The sisters were thus too busy to teach the nurses anything, and the nurses never had time to be interested in what went on.

I trained in an LCC hospital, and was half-way through my training when war broke out. I don't think I had to wash up after patients' meals 6 times during my training, and I never saw a nurse sweep a ward floor. The system adopted by the LCC of using 2 orderlies to each ward, as well as a ward-maid, could indeed be followed by other hospitals with advantage.

I have asked a number of women whether they would work in hospital as domestics or orderlies; they say they would like the work and the hours, but point out that they can get 2*s.* and 2*s.* 6*d.* an hour elsewhere. The solution seems to be more salary for domestic staff in hospital. Incidentally, salary seems to be the least of the grumbles of the student nurse.

I wish the medical staff would become a little more interested in these problems. The nursing care of their patients should be their concern, and if this is skimped they can't expect the desired results from the treatment.

Leytonstone. E. M. BATEMAN.

HYPOPIESIA

SIR,—At times one is hard put to it to find the serviceable treatment for low blood-pressure attended by symptoms, usually distinctive enough, if subjective. In the adult, hypopiesia is taken to mean a systolic pressure of 110 mm. Hg or less, with a diastolic pressure ranging below 70 mm. Hg; this last may, however, go undetermined because of the transitional sound being indistinct or inaudible. The disorder is physiological and symptomless in some, symptom-producing in others, symptomatic of co-existing disease in others still.

The ambulant hypopietic, who comes complaining, is conscious of an ailment he cannot define: he shows a disposition to fleeting hypotensive attacks, the nature of which examination will bring to light. The guiding symptoms consist in dizziness on change of posture to the upright, spells of weakness and tiredness, with a lessening of physical strength; inability to stand about beyond minutes without this inducing sweatings, yawning, nausea, and faintness; throbbing pulsation in head and fingers synchronous with the pulse-beat; and the patient is introspective and neurasthenic.

An oppressive hypotension, with symptoms such as these, is commoner in men than in women. During the war years, the derangement was found to be not infrequent among those who were compelled to stand while at work. The cause assigned was lowered vasomotor control with vascular stagnation in the splanchnic circulation, excited or aggravated in attacks by some emotional or digestive upset.

In treatment, little beyond temporary benefit, if any, is to be had by the use of pressor drugs such as amphetamine sulphate, adrenaline, or ephedrine. In practice, galenicals are only a small part of the treatment, which, after all, should not consist in spasmodic attempts at raising pressure in terms of millimetres of mercury. Whatever therapeutic method is employed, no speedy or persistent rise in pressure that is substantial is likely to happen: furthermore, efforts aiming solely at buoying up to register rises in pressure by instrument are for the most part misdirected, and are apt to miscarry. Reassurance, enough rest, with regular physical exercise, all will help; but what I find affords greatest benefit is a firmly adjusted four-inch or five-inch abdominal web belt, with buckle fastening, worn over clothing at hip level to give an uplift to the lower abdomen. This, if need be, can be kept in position by a perineal thong. The belt succeeds when nothing else will, and is usually declared by the sufferer to be a helpful, invigorating part of the treatment; so much so that he will by and by cling to the belt tenaciously and for long. Even in the hypopietic who takes to the air, whether as pilot or passenger, the abdominal belt so worn may obviate the symptoms excited by quick variations in height and air-pressure while flying, and appears to me to be a necessary item of equipment for all airmen.

Hypotensive attacks are transient and troublesome, though neither morbid or mortal. With the correcting of concomitant disorder or disease, the supporting belt seems to be the best remedy at present available; and invariably is accepted by the patient as being good and sufficient for his disability.

Bournemouth. S. WATSON SMITH.

BISMUTH COMPOUND IN ARTHRITIS

SIR,—Last year you published a communication from me announcing the use of sodium bismuthyl-tartrate in arthritis (1944, i, 264). Although it has been in the *British Pharmacopeia* since 1936, its use had hitherto been confined to the treatment of yaws and syphilis.

The injection which appears in the *BP* is not entirely suitable for use in rheumatism, and a better and more stable solution has been made for me by Messrs. C. J. Hewlett & Son, Ltd. Administered with the usual aseptic precautions it should not produce any undue local reaction. Having used the drug now for several years, I have given some thousands of doses without any mishap, and have yet to meet with any toxic effects. With increasing experience, however, I have modified my technique of dosage. I now rarely find it necessary to give more than half a grain in a single dose, or to repeat it in less than four weeks. After a few doses this period can be extended to six weeks or two months; and, in a few of the more intractable cases where administration has to be continued for upwards of a year, I have found that a dose every three months is all that is required. To exceed this dosage is to court failure. It is of equal importance to inject the solution deeply into the muscles either of the gluteal region or of the thigh (through the fascia lata). A number of cases have been brought to my notice where these precautions have been neglected, with dire results. Unfortunately in such cases it is almost always the drug that is blamed and not the user.

Cases that have been treated unsuccessfully with gold salts, because of their intolerance or their lack of response, should not be treated with this drug until all the gold has been eliminated. This may take upwards of a year. When gold has been used it is wise to commence with smaller doses and proceed slowly until responses are gained. Bismuth, like gold, belongs to the group of heavy metals and probably acts in a similar manner. But it has less toxic effects, and I regard it as superior to gold, both for this reason and because fewer doses need be given.

I am often asked what is its precise action on the body and how it produces the results claimed. A correct answer to this demands extensive laboratory investigation which I am not in a position to pursue; nor have I, so far, been able to persuade anyone else to investigate. Personally, I am quite content that its action should be regarded as empirical. Numbers of our best-known and successful remedies are.

London, W1. PERCY HALL.

MEDICAL FILMS

SIR,—May I, from the student's point of view, suggest a programme of development?

The many films demonstrating surgical operations may be useful to postgraduate and research workers, but not to the student, who needs little knowledge of operative surgery. On the other hand, films dealing with the diagnosis of "surgical" conditions, and the indications for operations, are urgently required. Films of "medical" conditions are also almost unobtainable. This particularly applies to those presenting short case-histories, which need not contain controversial material.

Having decided on the type of film required, a long-term and a short-term policy, to operate simultaneously, are necessary. The former would operate through a university grant for film-making; this could be divided into two parts, the larger fraction to be devoted to commissioning films requiring considerable technical resources (e.g., animation) by professional units, and the smaller to making the "non-controversial case-history" type. The latter could well be entrusted to the teachers and students of medical schools who are interested in film-making. The theory that only professionals can produce a good teaching film has recently been disproved by the private production of *An Introduction to Acute Inflammation* by three students (now qualified) of the Westminster Hospital. With this example, the formation of staff-student film units, prepared to make films within a circumscribed area, should not be difficult, if money is forthcoming.

As an immediate step towards increasing the number of useful films available, a few thousand pounds would

be well spent in sending a purchasing commission, of perhaps six people, to the United States. This might consist of two members of the medical standing committee of the Scientific Film Association, two teachers, and (may I humbly suggest ?) two students. From such a move we could expect a large and valuable stock of medical films in this country within a matter of months.

British Medical Students Association, BMA House, Tavistock Square, London, WC1. RICHARD R. L. PRYER, Acting Film Secretary.

LETTERS OF UNKNOWN ORIGIN.—We must remind correspondents that letters sent for publication under a pseudonym must always be accompanied by a note of the author's name and address. We have lately received several communications which cannot be published until we know their origin.—ED. L.

Public Health

Poliomyelitis among Campers

THE outbreak of poliomyelitis among a party of 130 Ilford scouts, who were in camp at Forest Row, Sussex, during the early days of August is so far limited to 8 cases. Dr. J. H. Weir, acting MOH for Ilford, reports that the boys returned from camp on Aug. 10, the first case being admitted to the Ilford Isolation Hospital on Aug. 19. The infection was severe, and the child died four days later despite the use of the Both respirator. Apart from this boy, 4 moderately severe and 2 mild cases, and 1 doubtful case have been admitted to hospital. All were members of the camping party except one girl, sister of a scout who had been at the camp but had himself shown no symptoms. The patients are progressing well, and the Both respirator gave considerable relief to one boy during the acute phase. As soon as the diagnosis of the first case was established, the Ministry of Health, the regional medical officer, the local authorities in Essex and Sussex, and the London Regional Scout Headquarters were informed, and all local doctors and hospitals were notified. Contacts were traced immediately and sanitary inspectors saw and advised them. Some of the camp equipment had been stored in a local church hall, and this has been disinfected by spray.

The outbreak serves to recall the part which flies are believed to take in the spread of infection (see *Lancet*, Sept. 1, p. 278). Camping sites, especially near farmyards, can be encouraging to flies. The Sussex camps, however, were isolated in the forest, not being close to the town or to any farmsteads. Flies seem to have been scarce rather than abundant, and the sanitary accommodation is said to have been well planned and properly looked after, under the supervision of the scoutmasters. Dr. G. K. Thornton, who attended the boys when they showed any indisposition, reports that 5 of them were in the sanatorium hut for one night on Aug. 6, one with bruises and 4 with slight temperatures and headaches. One of the 4 developed poliomyelitis on Aug. 13: the others are being followed up. No local cases have been reported near Forest Row, so far. The boys in the camps were at liberty to go where they pleased on one half-day a week—to visit the town and attend the cinema if they wished—but few of them took advantage of the opportunity; they preferred the attractions of the camp.

INFECTIOUS DISEASE IN ENGLAND AND WALES

WEEK ENDED SEPT. 8

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1151; whooping-cough, 1177; diphtheria, 423; paratyphoid, 12; typhoid, 12; measles (excluding rubella), 538; pneumonia (primary or influenzal), 268; puerperal pyrexia, 142; cerebrospinal fever, 25; poliomyelitis, 25; polio-encephalitis, 3; encephalitis lethargica, 2; dysentery, 278; ophthalmia neonatorum, 74. No case of cholera or typhus was notified during the week.

The number of service and civilian sick in the Infectious Hospitals of the London County Council on Sept. 5 was 947. During the previous week the following cases were admitted: scarlet fever, 65; diphtheria, 27; measles, 12; whooping-cough, 24.

Deaths.—In 126 great towns there were no deaths from measles, 1 (0) from an enteric fever, 1 (0) from scarlet fever, 7 (3) from whooping-cough, 14 (0) from diphtheria 64 (9) from diarrhœa and enteritis under two years, and 8 (2) from influenza. The figures in parentheses are those for London itself.

Newport, Mon., reported the fatal case of enteric fever. There were 4 deaths from diphtheria at Nottingham.

The number of stillbirths notified during the week was 182 (corresponding to a rate of 27 per thousand total births), including 18 in London.

On Active Service

AWARDS

CBE

Brigadier G. J. V. CROSBY, MD CAMB., RAMC

DSO

Brigadier A. N. T. MENECES, CBE, MB LOND., RAMC

OBE

Lieut.-Colonel E. J. CROWE, LRCPI, IMS
Lieut.-Colonel J. M. MACF. DREW, MRCS, IMS
Lieut.-Colonel P. B. LONGDEN, MRCS, RAMC
Lieut.-Colonel A. J. MARTIN, MRCS, RAMC
Colonel M. S. PURVIS, MD GLASG., IMS
Lieut.-Colonel C. E. ROBERTS, BM OXFD, RAMC
Lieut.-Colonel R. N. TATTERSALL, MD LOND., RAMC
Lieut.-Colonel JOHN WAKEFORD, Southern Rhodesia Medical Corps
Colonel T. F. M. WOODS, MD DUBL., RAMC
Lieut.-Colonel E. C. JANES, RCAMC
Lieut.-Colonel J. S. McCANNEL, RCAMC

MBE

Captain H. C. CAMPBELL, MB GLASG., RAMC
Captain DHIAN SINGH, IAMC
Major J. C. GREGORY, LMSSA, RAMC
Lieut.-Colonel D. A. LANGHORNE, FRCSE, RAMC
Major J. S. McCRAE, MB GLASG., RAMC
Captain R. G. McWHINNEY, MB GLASG., RAMC
Major C. F. VIEYRA, LMSSA, IMS
Captain C. H. CONWAY, RCAMC
Major ROBERT FERGUSON, RCAMC
Major W. S. GILCHRIST, RCAMC
Major C. C. HENNEBERG, RCAMC
Major W. M. G. WILSON, RCAMC

MC

Captain G. K. BEATTY, MRCS, RAMC
Captain T. A. TAYLOR, MB MANC., RAMC
Captain JACK WEIR, MB GLASG., RAMC

MENTIONED IN DESPATCHES

Surgeon Lieutenant J. A. COSH, RNVR
Surgeon Lieutenant A. P. B. WAIND, DSC, RNVR
Surgeon Lieutenant W. J. WINTHROP, RCNVR (posthumously)

COMMENDED

Wing-Commander R. H. WINFIELD, DFC, AFC, MB

Wing-Commander Winfield was a member of the crew of the RAF bomber *Aries* who in May made a successful flight over the North Pole.

UNIVERSITY OF HEIDELBERG.—Dr. Karl Bauer, who has lately been appointed rector of the university, has been head of the department of surgery at Heidelberg since 1943. The town has suffered very little damage and the university buildings are intact. It is hoped that the medical faculty will reopen in October with about 1000 students, and last month a start was made with ten-week refresher courses for doctors from the Wehrmacht.

CHADWICK PUBLIC LECTURES.—The first lecture of the autumn programme will be given at 26, Portland Place, London, W1, on Tuesday, Oct. 2, at 2.30 PM, when Mr. A. F. Russell, ARIBA, will speak on planning for new housing standards. Other lecturers will include Dr. W. P. Kennedy on health education (42, Broadway, SW1, Oct. 30, 2.30 PM); Mr. F. C. Vokes, sewage disposal (90, Buckingham Palace Road, SW1, Nov. 13, 2.30 PM); and Dr. A. M. H. Gray, social aspects of industrial dermatitis (Westminster Hospital medical school, 17, Horseferry Road, SW1, Nov. 29, 2.30 PM). Further particulars may be had from the secretary of the trust, 204, Abbey House, Westminster, SW1.

Obituary

JOHN LOWNDES MOIR

M B MANC

Dr. J. L. Moir, who died in the Manchester Royal Infirmary on July 24 at the age of 63, had been in practice at Congleton, Cheshire, for over twenty years before he retired in 1932 to his father's old home at Cemaes Bay in the Isle of Anglesey. His retirement was full and happy, for it gave him leisure to develop former interests and explore new ones. In 1935 he was called to the bar at the Middle Temple, and this forensic recruit later contributed a paper on medical aspects of crime to the *Medico-Legal Review*. As a speaker he was much in demand on the island, and many will remember his Armistice Sunday addresses at Cemaes church. The work of the Red Cross and the Order of St. John had always claimed much of his time, for he firmly believed in the importance of a widespread knowledge of first-aid in all sections of the community. He thought that the Government should make a proficiency certificate in this subject compulsory for school-leavers and that it should also be part of the medical student's training. He urged doctors to take a greater interest in its teaching, which he held should be definite, dogmatic, and up-to-date, and for several years, with the help of carefully chosen collaborators, he had been preparing a book of "fundamental first-aid."

On the outbreak of war he found he was too old to join the RAMC but he gave useful service as county medical officer and county civil defence officer for the British Red Cross Society, and he was also medical officer in charge of Gadlys Auxiliary Hospital at Cemaes Bay. Perhaps his most important war work, however, was done as zone medical officer to the Anglesey Home Guard, in which he held the rank of lieut.-colonel. Here he found realistic scope for his enthusiasm for first-aid, and in our columns with Mr. Kelsey Fry he published a method of treating a fractured jaw, and with Air-Commodore H. O. Clarke a method of moving, where needs must, a patient with a fractured spine. He also sponsored in his unit Colonel Duff's all-purpose stretcher. A month before his death he was appointed the medical member of a pensions appeal tribunal.

Dr. Moir was educated at Charterhouse and the University of Manchester, where he graduated MB in 1908. After holding a house-appointment at the Royal Infirmary he settled at Congleton in 1910, and in the following year he married Frances Parkin. Their only son, now serving in the RNVR, was named after her cousin, the late Lord Moynihan.

Births, Marriages, and Deaths

BIRTHS

BENNETT.—On Sept. 12, at Norwich, the wife of Surgeon Commander H. J. Bennett, RN—a son.

EDWARDS.—On Sept. 10, at Woodford, the wife of Dr. Alan Edwards—a daughter.

SCOTT.—On Sept. 8, in London, the wife of Dr. M. Gilbert Scott—a son.

STEEL.—On Sept. 9, at Edinburgh, the wife of Captain H. M. Steel, RAMC (CMF)—a daughter.

TAYLOR.—On Sept. 8, in London, to Dr. Ruth Taylor (*née* Howitt), wife of Surgeon Lieut.-Commander Selwyn Taylor, RNVR—a son.

VIRET.—On Sept. 9, at Woking, the wife of Surgeon Lieut.-Commander W. F. Viret, DSC, RN—a daughter.

MARRIAGES

BRUCE—FOSTER-BARHAM.—On Sept. 8, at Cambridge, Stuart Bruce, captain RAMC, to Diana Joan Foster-Barham.

CAMERON—KINGCOME.—On Sept. 8, in London, Charles William Morrison Cameron, MB, to Joan Furze Kingcome.

REES—WHELDON.—On Sept. 8, at Pwllheli, Richard Lestrem Rees, captain RAMC, to Mair Wheldon.

WILLS—MOORE.—On Sept. 8, in London, John Wills, captain RAMC, to Anne Hamilton Moore.

DEATHS

DOBIE.—On Sept. 9, at Criccieth, Edward Cyril Dobie, MB EDIN.

FAIRRIE.—On Sept. 4, at Bournemouth, Septimus Harold Fairrie, MB VICT., lieut.-colonel RAMC.

HENDRY.—On Sept. 9, in Glasgow, James Hendry, MB GLASG., FRCOG, regius professor of midwifery in the University of Glasgow.

LENNANE.—On Sept. 12, Gerald Quin Lennane, MC, FRCSI, DPH, formerly MOH for Battersea, aged 76.

LUMSDEN.—On Sept. 14, in London, Isabella Lumsden, MB GLASG.

OZANNE.—On Sept. 14, at Harrogate, Ronald Cathcart Ozanne, MA, BM OXFD, aged 58.

TARR.—On Sept. 1, at Kotagiri, S. India, William Tarr, MD, FRCS, FRCSE, lieut.-colonel IMS retd.

Notes and News

WAR-TIME NURSES

THE General Nursing Councils for England and Wales and for Scotland have agreed to grant a remission of 6 months in the training for State Registration to men and women who have had suitable nursing experience in the Forces, or as members of the Civil Nursing Reserve, the British Red Cross Society, or the St. John Ambulance Brigade. Those who qualify for this remission will be able to enter for both parts of the preliminary examination after 6 months' training. Those seeking remission must :

1. Produce evidence of not less than 2 years' experience of hospital nursing under supervision of trained nurses, and be recommended by the matron of the hospital in which they served.
2. Enter for the first preliminary examination held after 6 months' training. (In Scotland they have the option of sitting part II of this examination—the theory and practice of nursing—before starting training.)
3. Apply within 6 months of release from the Forces or the CNR or other nursing body to the hospital at which they wish to train.

Remission can be claimed for appropriate experience acquired at any time since Sept. 3, 1939.

CHILD ADOPTION

CONTROL of undesirable societies and bodies for child adoption was strengthened by the 1939 Act, which came into force in 1943, but private adoptions can still be arranged; and though in some cases the placing of the child may be undertaken carefully and conscientiously by responsible and trustworthy people, the system is obviously open to abuse. At a joint conference, held in London on Sept. 11, of the National Council of Social Service and the National Council for Maternity and Child Welfare, the National Children's Adoption Association, the National Adoption Society, and the Waifs and Strays Society, defects in the existing law were thoroughly aired. Speakers mentioned cases where, though the adoption was sanctioned by a court, the adopting mother was a criminal or other undesirable person. The child is examined medically, but no medical examination of the adopters is required by law. Birmingham has voluntarily accepted the principle, and several would-be adopters have proved unsuitable on examination. The adopting couples, too, need some measure of protection: they naturally like to take a child in infancy, but in the early months of life it is often impossible to detect mental deficiency. It was suggested that adopters might be spared the unexpected burden of a mentally defective child if the probationary period was longer. Some of the faults of the present system, it was felt, might be avoided if local welfare authorities had more powers of control, and if juvenile courts were more careful about granting adoption orders.

INVITATION TO SANATORIUM NURSING

A PAMPHLET (*The Healing Touch*) originally compiled by the National Association for the Prevention of Tuberculosis, and now issued by the Ministry of Labour, sets out the acute need for sanatorium nurses, and appeals to nurses and other women to take up this branch of work. It is well written, and on the whole fair, neither diminishing the drawbacks nor magnifying the compensations; but, like most pleas for nursing personnel today, it suffers from having to put a weak case. The final appeal has to be to altruism: "Our Sanatoria are understaffed: they are in need of your help . . . tuberculosis nursing is essential work. It's a big responsibility. But you can take it."

Some hints of easily remediable weaknesses in the present system find a place in these pages. "Feeling decidedly like pioneers, they put on their uniforms and set off on the first duty—a minor task, probably, designed to give the recruit something to do on her first day." But, of course, on her first day, and for several succeeding days, the recruit should have gone straight to the lecture room to be taught methodically and practically the technique of avoiding infection. Potential recruits may well wonder why experience precedes learning. "The nurse properly trained in a modern sanatorium," the pamphlet justly says, "is an all-round competent person able to adapt herself mentally to any kind of nursing that the growing art of medicine requires." True; but how is the recruit to know what "properly trained" means, or to recognise a "modern sanatorium" from its outsides? Until

we can guarantee that women entering to train as nurses, whether in sanatoriums or any other kind of hospital, will get good teaching, adequate protection from infection, and a reasonable private life, candidates will go on seeking other occupations, or will come into nursing only to give it up after a short trial. A wastage in the region of 60% in the early years of training is a severe criticism of things as they are.

A NEW JOURNAL

CLINICAL pathologists are known to be tenacious in overcoming difficulties, and they must have needed this quality to bring out a new journal just now. The first number of the *Proceedings of the Association of Clinical Pathologists* is well printed on good paper with an austere, attractive cover in white and blue. It contains six original articles and some excellent plates. Time and hard necessity will probably encourage the editors to pack the pictures more closely on their art paper, and never to leave one side of it blank; but otherwise they seem to have little to learn. They expect to produce it irregularly for the present and not at any fixed intervals of time. This journal has long been needed and will be welcome to many besides the group who have founded it. We wish it long life.

PRECAUTIONS AGAINST TYPHUS

To prevent the spread of typhus westward SHAEF established a sanitary cordon along the Rhine last March, and ordered that all civilians should be deloused before crossing it. In addition, delousing was made a routine for all contacts of typhus patients, and for displaced persons and others who had been in Germany, Poland, and the Baikans; also for refugees and inmates of concentration camps, gaols, and other institutions. A stockpile of more than a million pounds of DDT had been placed in readiness with plans for delousing some 18 million persons as soon as military operations permitted. Brigadier-General James S. Simmons, of the office of the Surgeon-General at Washington, who gives this information, believes that the delousing programme "saved the European continent from the typhus scourge that raged through Europe following the first world war."

More than 2 million people have been immunised against typhus since the United States Typhus Commission went to Yugoslavia last January.

A LEAFLET FOR WOMEN

A SENSIBLE, clear, and short account of menstruation, for distribution at welfare centres, has been published on a blue leaflet by the National Baby Welfare Council, at the expense of Messrs. John Knight Ltd. It sets out the facts about normal menstruation in adolescence, after childbirth, and during the menopause, and gives useful advice about hygiene at the period. Abnormalities are mentioned placidly, and even those which call for treatment are not discussed in a way to cause alarm. The leaflet may be purchased at 1*s.* 9*d.* a dozen from the Council's offices at 29, Gordon Square, London, WC1.

Hospital Day in London

The annual street collection in aid of London's voluntary hospitals will be held this year on Oct. 2. Collectors are urgently needed, and volunteers should offer their services to their nearest voluntary hospital or to Lord Luke, chairman, Hospitals Day, 36, Kingsway, WC2.

Royal Sanitary Institute

On Saturday, Sept. 29, at 10.45 AM, at the Southern Secondary School, Portsmouth, Dr. I. M. McLachlan will review the first year's working of mass radiography in the borough, and afterwards Surgeon Captain E. C. Holtom will speak on sanitation in the Navy.

Association of Industrial Medical Officers

The annual general meeting of the association will take place on Friday, Oct. 19, at the London School of Hygiene, Keppel Street, London, WC1, at 2.30 PM. The speakers will include Dr. J. C. Bridge and Mr. H. E. Griffiths. A dinner will be held in the evening, and applications for tickets should be sent to Dr. W. Blood, Cadby Hall, Kensington, W14.

Tropical Skin Diseases

It is stated that in tropical areas about 8% of all admissions to hospital from the United States Army are for skin disorders. The good nutritional state of the American soldier, however, is believed to protect him from some of the skin diseases prevalent among natives of the tropics. "Tropical ulcer," for example, is rare in the U.S. Army, though other forms of ulceration are common enough.

Biochemical Society

A meeting will be held in the human nutrition research unit of the Medical Research Council at the National Hospital, Queen Square, London, WC1, on Friday, Sept. 28, at 11 AM, when short communications and demonstrations will be given.

Medical Society of the LCC Service

There will be a clinical meeting of the society on Thursday, Oct. 4, at 3 PM, at Lewisham Hospital, SE13, when members of the staffs of that hospital and of St. Alfege's will demonstrate cases.

Return to Practice

It has been officially announced that Dr. R. R. TRAIL, FRCP, has resumed civilian practice at 55, Harley Street, London, W1, and that Dr. E. L. BARTLEMAN will resume practice at 58, Portland Place, W1, on Oct. 1.

Royal Free Hospital

On Friday, Sept. 28, at 3 PM, Lord Moran, FRCP, will deliver the inaugural address at BMA House, Tavistock Square, London, WC1.

Course for the DMR at Manchester

Candidates for the diploma in medical radiotherapy of the Royal Colleges are required to attend a course of systematic instruction for 9 months and to spend a further 18 months in the radiotherapeutic department of a recognised hospital. To meet these requirements a course of lectures and practical demonstrations will begin at the Holt Radium Institute, Manchester, early in January 1946, and it is hoped that afterwards paid posts will be found for candidates in radiotherapeutic departments, where they may complete the attendance required. Further information may be obtained from the dean of the medical school of the University of Manchester. Special consideration will be given to doctors who have been demobilised.

A Domiciliary Consultant Service

The *Manchester Guardian* of Sept. 14 reports that a new scheme has been introduced at Salford whereby a doctor may summon a specialist to the bedside of any of his child patients at the expense of the health department of the town. The only condition is that notice must first be given to Dr. Margaret Sproul, senior medical officer for maternity and child welfare, at the health offices, Regent Road, Salford. Dr. J. L. Burn, the medical officer of health, has introduced the system because he fears that in working-class families doctors are sometimes forced to take risks by ordering a child's removal to hospital, when gravely ill, as the only way of obtaining specialist opinion.

Catalogue of Scientific Films

The Scientific Films Committee of the Association of Scientific Workers has now revised and printed its catalogue of scientific films, which indicates their suitability for various types of audience. The catalogue may be had for 2*s.* 6*d.* from the Association at Hanover House, 73, High Holborn, London, WC1.

Dr. A. H. G. BURTON, medical officer of health for Ilford for 26 years, is retiring at the end of this month, and the borough council are presenting him with a testimonial under seal recording their appreciation of his service.

Major-General PAUL R. HAWLEY, formerly chief surgeon of the European Theatre of Operations, and Brigadier-General ELLIOTT C. CUTLER, chief medical consultant with the European Service of Supply, have temporarily joined the staff of the Veterans Administration in Washington. General Hawley is medical adviser to the Administrator of Veterans' Affairs (General Omar Bradley), and General Cutler is attached to his staff.

Appointments

CROUCH, MURIEL, MB LOND.: surgical registrar, Oster House EMS Hospital, St. Albans.

HUGHES, PATRICK, MRCPI: temp. hon. physician, Weymouth and District Hospital.

MACDONALD, H. A., FRCSE: RSO, Great Yarmouth General Hospital.

NICHOL, R. W., BA CAMB., MRCS, MRCOG: temp. obstetrician and gynæcologist, emergency maternity unit, Bradford-on-Avon, Wilts.

STAVELEY, DULCIE, MB LOND., DMRE: part-time radiologist, Elizabeth Garrett Anderson Hospital, London.

WEIR, J. H., MD, B HY DURH.: act. MOH for Ilford.

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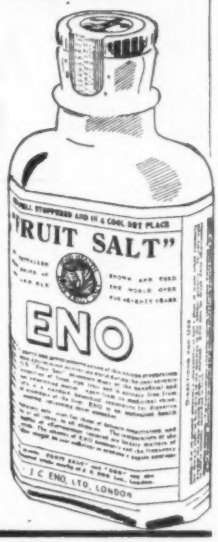

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This Registered Hospital is situated in 130 acres of park and pleasure grounds. Voluntary patients, who are suffering from incipient mental disorders or who wish to prevent recurrent attacks of mental trouble; temporary patients, and certified patients of both sexes are received for treatment. Careful clinical, bio-chemical, bacteriological, and pathological examinations. Private rooms with special nurses, male or female, in the Hospital or in one of the numerous villas in the grounds of the various branches can be provided.

WANTAGE HOUSE

This is a Reception Hospital in detached grounds with a separate entrance, to which patients can be admitted. It is equipped with all the apparatus for the complete investigation and treatment of Mental and Nervous Disorders by the most modern methods; insulin treatment is available for suitable cases. It contains special departments for hydrotherapy by various methods, including Turkish and Russian baths, the prolonged immersion bath, Vichy Douche, Scotch Douche, Electrical baths, Plombières treatment, etc. There is an Operating Theatre, a Dental Surgery, an X-Ray Room, an Ultra-violet Apparatus, and a Department for Diathermy and High-frequency treatment. It also contains Laboratories for bio-chemical, bacteriological, and pathological research. Psychotherapeutic treatment is employed when indicated.

MOULTON PARK

Two miles from the Main Hospital there are several branch establishments and villas situated in a park and farm of 650 acres. Milk, meat, fruit, and vegetables are supplied to the Hospital from the farm, gardens, and orchards of Moulton Park. Occupational therapy is a feature of this branch, and patients are given every facility for occupying themselves in farming, gardening, and fruit growing.

BRYN-Y-NEUADD HALL

The seaside house of St. Andrew's Hospital is beautifully situated in a Park of 330 acres, at Llanfairfechan, amidst the finest scenery in North Wales. On the North-West side of the Estate a mile of sea coast forms the boundary. Patients may visit this branch for a short seaside change or for longer periods. The Hospital has its own private bathing house on the seashore. There is trout-fishing in the park.

At all the branches of the Hospital there are cricket grounds, football and hockey grounds, lawn tennis courts (grass and hard courts), croquet grounds, golf courses, and bowling greens. Ladies and gentlemen have their own gardens, and facilities are provided for handicrafts, such as carpentry, etc.

For terms and further particulars apply to the Medical Superintendent (TELEPHONE: No. 2356 and 2357 Northampton), who can be seen in London by appointment.

RUTHIN CASTLE, NORTH WALES

A Private Clinic, the first in Great Britain, for investigation and treatment of all forms of disease, except infectious and mental

Nursing, dietetic, massage, x-ray and laboratory departments. Central heating and a lift to all floors.

Inclusive charges Apply SECRETARY Telephone: Ruthin 66

COURT HALL, KENTON, near EXETER

FOR THE TREATMENT OF EIGHT LADIES, VOLUNTARY, TEMPORARY AND CERTIFIED PATIENTS

CLIFFDEN, TEIGNMOUTH

FOR EARLY AND CONVALESCENT CASES Recreational Therapies are held daily by skilled Leaders

The house stands high with spacious balconies and extensive views of the South Devon Coast. Beautiful garden. Own Dairy in 25 acres. Private road to beach. There is also a charming house, EBWORTHY, MANATON, DARTMOOR, situated in 20 acres, 1100 ft. up for bracing moorland air

Resident Physicians—BERTHA M. MULES, M.D., B.S. ANNE S. MULES, M.R.C.S., L.R.C.P. *Telephones*—STARCROSS 259 and TEIGNMOUTH 289

CHEADLE ROYAL CHEADLE CHESHIRE

A Registered Hospital for MENTAL DISEASES, and its Seaside Branch, GLAN-Y-DON, Colwyn Bay, N. Wales

THE object of this Hospital is to provide the most efficient means for the treatment and care of those of the Upper and Middle Classes suffering from MENTAL and NERVOUS DISEASES. The Hospital is governed by a Committee appointed by the Trustees of the Manchester Royal Infirmary. VOLUNTARY, TEMPORARY, AND CERTIFIED PATIENTS RECEIVED

For Terms and further information apply to the MEDICAL SUPERINTENDENT *Telephone*: GATLEY 2231

PECKHAM HOUSE, 112, Peckham Road, London, S.E.15

Telegrams: "Alleviated, London" Telephone: Rodney 2641-2642

A Private Mental Hospital, for Ladies and Gentlemen suffering from Nervous and Mental Illness, where the amenities of a comfortable home are combined with full investigation and every well-established modern treatment.

Terms from £4.4.0 weekly.

Illustrated Prospectus may be obtained from the Physician Superintendent.

THE OLD MANOR, SALISBURY

Telephone: 3216 & 3217

A Private Hospital for the Care and Treatment of those of both sexes suffering from MENTAL DISORDERS

Extensive grounds. Detached Villas. Chapel. Garden Produce from own gardens. Terms very moderate.

CONVALESCENT HOME AT BOURNEMOUTH

standing in 12 acres of ornamental grounds, with separate villas, tennis courts, etc. Patients or Boarders may visit the Home by arrangement.

Illustrated Brochure on application to the Medical Superintendent, The Old Manor, Salisbury.

HEIGHAM HALL, NORWICH

PRIVATE MENTAL HOME for Nervous and Mental illness. All forms of treatment available. Fees from 4 gns. per week upwards according to requirements. Vacancies occasionally exist at reduced fees on the recommendation of the patient's own physician.

Apply to Dr. J. A. SMALL. Telephone: Norwich 20080

FENSTANTON at "FIVE DIAMONDS," Chalfont St. Giles, Bucks

A Private Home for the Care and Treatment of a limited number of LADIES with Mental and Nervous Disorders. Certified, Voluntary, and Temporary Patients received. Mansion with 12 acres of ground. (See *Medical Directory*, p. 2517.) Apply Resident Physician. Telephone: Little Chalfont 2046. Station: Chalfont and Latimer.

THE RETREAT, YORK

The Pioneer Hospital, opened 1796, for the humane treatment of those suffering from Nervous and Mental Disorder

This Hospital of 200 beds, administered by a Committee of the Society of Friends, combines what is best in the investigation and treatment of nervous illness with a sympathetic and friendly atmosphere. Last year 233 patients were admitted, of whom 184 were voluntary cases.

Much curative work is accomplished in our mental hospitals to-day and the recovery rate compares very favourably with that of our general hospitals.

For information and terms of admission apply to:—
The Physician Superintendent,
ARTHUR POOL, M.R.C.P.
(Telephone: York 3612)

CAMBERWELL HOUSE, 33, Peckham Road, London, S.E.5

Telegrams: "PSYCHOLIA, LONDON" — FOR THE TREATMENT OF MENTAL DISORDERS — *Telephone:* RODNEY 4242 (2 lines)

Completely detached Villas for mild cases. Voluntary Patients received. Twenty acres of grounds; own garden produce. Hard and grass tennis courts, putting greens, Recreation Hall with Badminton Court, and all indoor amusements. Occupational therapy, Calisthenics, Actino-therapy, prolonged immersion baths, shock and also modified insulin treatment. Chapel.

Senior Physician, Dr. HUBERT JAMES NORMAN, assisted by a resident Medical Staff and visiting Consultants

An Illustrated Prospectus giving fees, which are strictly moderate, may be obtained upon application to the Secretary

The Convalescent Branch is HOVE VILLA, BRIGHTON and is 200 ft. above sea-level

NORTHUMBERLAND HOUSE

Green Lanes, Finsbury Park, N.4

A PRIVATE HOSPITAL for the treatment of mental and nervous illnesses. Conveniently situated and easy of access from all parts. Six acres of ground, facing Finsbury Park. Voluntary and Temporary Patients received without certification. E.C.T. Shock therapy, Psychotherapy, and other modern forms of treatment. Telephone: STAmford Hill 2688. Telegrams: "Subsidiary, London."

For further particulars apply to the Medical Superintendent, ROBERT M. RIGGALL, Member British Psycho-Analytical Society.

CITY OF LONDON MENTAL HOSPITAL

Near DARTFORD, KENT

Ladies and Gentlemen received for treatment under certificates, and without certificates as either VOLUNTARY or TEMPORARY PATIENTS, at a weekly fee of £3 3s., and upwards

THE COTSWOLD SANATORIUM

On the Cotswold Hills, seven miles from Cheltenham, Stroud and Gloucester. Fully equipped for the treatment of all forms of Tuberculosis.

Terms: 6 to 10 guineas per week, inclusive.

Full particulars from MEDICAL SUPERINTENDENT, COTSWOLD SANATORIUM, CRANHAM, GLOUCESTER.

Telephone: Witcombe 2181 Telegrams: "Hoffman, Birdlip"

THE GRANGE, near ROTHERHAM

For Ladies suffering from Nervous and Mental Disorders Certified, voluntary and temporary patients received. Country house, beautiful grounds. 5 miles from Sheffield

Res. Phys.: GILBERT E. MOULD, L.R.C.P., M.R.C.S.

Ecclesfield 38330

MALLING PLACE, KENT

For LADIES and GENTLEMEN of Unsound Mind

Terms moderate. Apply to Resident Medical Superintendent. Telegrams: ADAM WEST MALLING. Telephone No. 2: MALLING.

ECCLESFIELD, STAPLEHURST, KENT

Home for the care and cure of Alcoholic cases (ladies). Fine mansion. 100 acres. Successful treatment. Catholic chapel on estate.

For terms apply to Sister Superior (Staplehurst 26111)

UNIVERSITY EXAMINATION POSTAL INSTITUTION

17, RED LION SQUARE, LONDON, W.C.1

Over 50 years' experience

POSTAL COACHING FOR ALL MEDICAL EXAMINATIONS

MEDICAL PROSPECTUS (24 pages)

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POSTGRADUATE STUDY: Instruction is arranged in medical, surgical, and special subjects, as circumstances permit.

Information and advice obtainable from THE FELLOWSHIP OF POSTGRADUATE MEDICINE, 1, Wimpole-street, London, W.1. LANgham 4266.

L.M.S.S.A.

FINAL EXAMINATION: SURGERY, 12th November, 10th December, 1945, 14th January, 1946. MEDICINE, PATHOLOGY, 19th November, 17th December, 1945, 21st January, 1946. MIDWIFERY, 20th November, 18th December, 1945, 22nd January, 1946. MASTERY OF MIDWIFERY EXAMINATIONS, May and November.

For regulations apply REGISTRAR, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

LICENCE IN DENTAL SURGERY.

Notice is hereby given that the Examination for the Licence in Dental Surgery will commence on the date stated below.

FINAL PROFESSIONAL EXAMINATION
Monday, 22nd October.

Candidates who have complied with the necessary requirements and who desire to present themselves for examination must apply in writing to the Examination Hall, 8–11, Queen-square, London, W.C.1, at least 21 days before the date of the Examination, transmitting at the same time such certificates as may be required by the regulations, together with the full amount of the fee due for the part or parts which they desire to enter. HORACE H. REW, Director of Examinations.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

DIPLOMA OF FELLOW.

Notice is hereby given that the following Examinations will commence on the dates stated below.

PRIMARY EXAMINATION
Monday, 22nd October.

FINAL EXAMINATION
Thursday, 1st November.

Candidates who have fulfilled the necessary conditions and who desire to present themselves for examination must give notice in writing to the Director of Examinations, Examination Hall, 8–11, Queen-square, London, W.C.1, at least 21 days before the Examination, transmitting at the same time such certificates as may be required by the regulations, together with the full amount of the fee for the Examination for which they desire to enter. HORACE H. REW, Director of Examinations.

THE MIDDLESEX HOSPITAL MEDICAL SCHOOL, W.1.

PRIMARY F.R.C.S. COURSE.

A Course of Instruction will begin on 5th November, 1945.
Anatomy, Embryology, and Histology.
Physiology and Biochemistry.
Pathology.

Instruction in the above subjects will be given under the direction of Professor John Kirk, Professor Samson Wright, and Professor E. C. Dodds, and Professor James McIntosh.

Fee—25 guineas.

Candidates must take the whole course.

Applications for admission should be made to the Medical School Secretary, The Middlesex Hospital, W.1.

THE NATIONAL HOSPITAL, Queen-square, W.C.1.

A course of 11 Clinical Demonstrations will be given on Saturday mornings at 10.30 from the 6TH OCTOBER to the 15TH DECEMBER, inclusive.

These Demonstrations are open to postgraduate students at a charge of 1 guinea for the course and to final-year students at a charge of ½ guinea. Members of His Majesty's and Allied Forces will be admitted free.

Applications for tickets should be made not later than 28th September, and applicants should give particulars of the examination for which they are working and the names of their Medical Schools. J. PURDON MARTIN, Dean.

EDINBURGH POSTGRADUATE BOARD FOR MEDICINE.

POSTGRADUATE COURSE IN SURGERY,
OCTOBER TO DECEMBER, 1945.

A Postgraduate Course in Surgery will be held in Edinburgh, beginning on 8th October and ending on 11th December.

The course will include Systematic Lectures on Surgery and Surgical Anatomy, Clinical Lectures, and Demonstrations on Surgical Pathology.

The total inclusive fee for the course will be £25.

Those who wish to take the course should notify the Secretary of the Postgraduate Board for Medicine, University New Buildings, Teviot-place, Edinburgh, as soon as possible.

BOROUGH OF WALTHAMSTOW. Thorpe Coombe Maternity HOSPITAL. (54 Beds.) Applications are invited from qualified medical Women, including W practitioners who now hold A posts, for the post of ASSISTANT RESIDENT MEDICAL OFFICER (B2) at a salary of £250, plus bonus £24 2s. 4d., with board, residence, and laundry.

Forms of application, to be obtained from the undersigned, should be completed and returned with copies of 3 recent testimonials as soon as possible. G. A. BLAKELEY,
Town Hall, Walthamstow, E.17. Town Clerk.

BRITISH POSTGRADUATE MEDICAL SCHOOL. (University OF LONDON.) Applications are invited from registered medical practitioners, Male and Female, including practitioners liable under the National Service Acts and within 3 months of qualification, for the following appointments:—

2 HOUSE PHYSICIANS (A).

HOUSE SURGEON (A) in Obstetrics; and HOUSE SURGEON (A) in Gynæcology.

Each post is vacant 1st November, 1945, and is for 6 months. The salary is at the rate of £105 p.a., plus full residential emoluments.

Apply the Dean, British Postgraduate Medical School, Ducane-road, W.12, before the 29th September, 1945.

WEST LONDON HOSPITAL, Hammersmith, W.6. Applications are invited from registered medical practitioners, for the appointment of RESIDENT ANÆSTHETIST AND AURAL AND OPHTHALMIC HOUSE SURGEON (B2), vacant 1st November. The appointment will be for a period of 6 months and may be terminated by 1 month's notice on either side. Salary at the rate of £150 a year, with the usual residential emoluments. R practitioners who now hold A posts may apply.

Applications, with particulars of age, nationality, medical school, qualifications with dates, experience, and accompanied by copies of 3 testimonials, should be sent not later than 5th October to: H. A. MADGE, Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. A Part-time SENIOR MEDICAL OFFICER is required for duty in the Out-patient Department, to attend from 9 A.M. on not less than 2 mornings each week. As the duties will involve the running of independent clinics, preference will be given to Members of the Royal College of Physicians and those having the Diploma in Child Health. A fee of 2 guineas will be paid for each session.

Further particulars and form of application, which must be returned not later than Wednesday, the 26th September, 1945, are obtainable from: H. F. RUTHERFORD, Secretary.

September, 1945.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. HOUSE OFFICER (A), including duties of Casualty Officer. Applications are invited for vacancy on 1st October from registered British practitioners, including those within 3 months of qualification and liable under the National Service Acts. Salary at £150 p.a., with full residential emoluments. To R practitioners the appointment will be for a period of 6 months.

Applications, stating age, qualifications with dates, accompanied by copies of recent testimonials, to be sent immediately to: F. A. LYON, Administrator and Secretary.

THE ROYAL EYE HOSPITAL, St. George's-circus, S.E.1. Applications are invited from registered practitioners, Male and Female, for the appointment of THIRD HOUSE SURGEON (B2), now vacant. The salary is at the rate of £175 p.a., with the usual emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise will be for the period ending 30th April, 1946.

Applications, stating age, nationality, qualifications with dates, and accompanied by copies of recent testimonials, to be sent to the Secretary on or before Tuesday, 2nd October, 1945.

LONDON COUNTY COUNCIL. Medical practitioners required for the undermentioned positions:—

(1) TEMPORARY ASSISTANT MEDICAL OFFICER, Class I (B1). Salary £350 a year, rising by £25 to £425 a year, plus temporary cost-of-living addition.

	Hospital	*Duties*
(*a*)	Lambeth Hospital, Brook-drive, Kennington-road, S.E.11.	Surgical.
(*b*)	St. James' Hospital, Ouseley-road, Balham, S.W.12.	Medical, children, and anæsthetics.
(*c*)	Infectious Hospitals Service	Experience in children's or infectious diseases desirable.
(*d*)	King George V Sanatorium, Godalming, Surrey.	Pulmonary tuberculosis.

Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

(2) TEMPORARY ASSISTANT MEDICAL OFFICER, Class II (B2). Salary £250 a year, plus temporary cost-of-living addition.

	Hospital	*Duties*
(*a*)	Grove Park Hospital, Lee, S.E.12.	Experience in pulmonary tuberculosis desirable.
(*b*)	High Wood Hospital for Children, Brentwood, Essex.	Chest cases, mostly tuberculosis.
(*c*)	Infectious Hospitals Service	Persons appointed to the Infectious Hospitals Service are eligible for promotion to Class I (B1) (temporary rank) in that service after a minimum period of 6 months.
(*d*)	Lewisham Hospital, Lewisham, S.E.13.	Obstetrics and gynæcology.
(*e*)	St. Giles' Hospital, St. Giles'-road, Camberwell, S.E.5.	
(*f*)	St. George-in-the-East Hospital, Raine-street, Wapping, E.1.	Casualty officer.
(*g*)	St. Leonard's Hospital, Nuttall-street, Kingsland-road, N.1.	
(*h*)	St. Nicholas' Hospital, 79, Tewson-road, Plumstead, S.E.18.	

R practitioners who now hold A posts may apply, when appointment will be limited to 6 months.

All the above positions are with board, lodging, and washing. Married quarters are not available.

Medical practitioner required as TEMPORARY VISITING MEDICAL OFFICER, St. George's Home, Milman's-street, Chelsea, S.W.10. Salary £200 a year, plus temporary cost-of-living addition, average attendance 1 hour daily. Applicants must reside within easy access of Home which accommodates 50 adult women suffering from pulmonary tuberculosis.

Application forms obtainable from the Medical Officer of Health (S.D.2), County Hall, S.E.1. Stamped foolscap envelope necessary, returnable by 8th October, 1945. Canvassing disqualifies.

LONDON COUNTY COUNCIL. Public Health Department. Consultant and Specialist Services—Whole-time Thoracic Surgeons. Applications are invited for permanent appointment to whole-time positions of (1) CHIEF THORACIC SURGEON and (2) THORACIC SURGEON in the Public Health Department of the London County Council, mainly for work in the Council's Sanatoria and Medical Tuberculosis Hospitals, but also as may be required at any of the Special or General Hospitals. The Chief Thoracic Surgeon, in addition to surgical work, will be responsible for organising all thoracic surgery in the Council's Hospital Service. Scales of salary: Chief Thoracic Surgeon, £2000–£100–£2500 a year. Thoracic Surgeon, £1250–£50–£1500 a year, plus cost-of-living addition (at present £60 a year for men, or £48 a year for women). There are no emoluments. If warranted by the status and experience of a selected candidate, appointment at a point higher than the minimum of the scale may be recommended.

Forms of application, giving particulars as to conditions of appointment and service, obtainable (stamped addressed foolscap envelope necessary) from Medical Officer of Health (S.D.6), County Hall, London, S.E.1. To permit of candidates in H.M. Forces serving overseas being considered the latest date for the return of application forms has been fixed for 28th January, 1946. If the selected candidate is subject to any restriction on the transfer of his service, or is engaged in National or essential Local Government Service, he will not be required to take up his new appointment until the restriction is removed.

Canvassing disqualifies.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 5, Lisle-street, Leicester-square, W.C.2. Applications for the post of OUT-PATIENT MEDICAL REGISTRAR, part-time, are invited to be sent to the undersigned on or before Saturday, 29th September, 1945. Remuneration at the rate of 1 guinea per Out-patient Clinic attended. Applicants must be duly qualified and registered medical practitioners.

Particulars of the duties can be obtained on application to—
24th August, 1945. LEONARD G. R. TURPIN, Secretary.

NATIONAL TEMPERANCE HOSPITAL, London, N.W.1. Applications are invited from registered medical practitioners for the post of RESIDENT MEDICAL OFFICER (B1). Salary is at the rate of £250 p.a., with board, residence, &c. Some previous residential experience necessary. The appointment is for a period of 6 months dating from 1st October, 1945. Suitably qualified R practitioners holding B2 posts, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications must be received not later than 27th September, 1945, by: A. C. ADAMS, Secretary.

THE ROYAL MASONIC HOSPITAL, Ravenscourt Park, London, W6. As already advertised there is a vacancy at the end of the year for a PHYSICIAN IN CHARGE of the Physiotherapeutical Department at the Hospital. This Department is exceedingly well equipped and the present holder of the office is retiring under the official age limit. Candidates should be well established in their profession. Applications should be made informally, in the first instance, without detailed copies of either testimonials or applications. They may be sent in the form of a cablegram should the candidate be at present serving overseas. If a successful candidate was serving actively in one of His Majesty's Forces or was a prisoner of war not yet repatriated the Board of Management would be willing to arrange for him to take up his appointment at the Royal Masonic Hospital when he was released from the Services. The retiring age for the post is 60. The number of beds in the Hospital is 200 to 220, of which for the time being a considerable proportion is given over to Service cases. There is an honorarium and certain small fees attached to the post.

Application should be made to the Joint Honorary Secretaries at the Hospital.

MILDMAY MISSION HOSPITAL, Austin-street, Bethnal Green, E.2. Applications are invited for the temporary post of GYNÆCOLOGIST (Woman), which will become vacant on or about 1st October, 1945. Applicants should be Fellows of the Royal College of Surgeons of England, and preferably Fellows or Members of the Royal College of Obstetricians and Gynecologists. The Council is anxious that all Members of the Hospital Staff should be in sympathy with the religious work of the Hospital.

Applications, together with testimonials, should be sent in as soon as possible to the Medical Superintendent.

GERMAN HOSPITAL, Ritson-road, Dalston, London, E.8. (British Voluntary Hospital under E.M.S. Scheme.) HOUSE PHYSICIAN (B2), with some practical experience, wanted at once. Commencing salary £200 p.a., or more according to experience, with full board and residence. R practitioners who now hold A posts may apply, when appointment will be limited to 6 months.

Please apply to the Secretary with copies of testimonials.

MIDDLESEX COUNTY COUNCIL. Medical Officer (B1, resident) required at Redhill County Hospital, Edgware, Middlesex. Applications invited from registered medical practitioners (including R practitioners holding B2 posts), who should preferably have held previous medical appointments. R practitioners holding B1 posts ineligible unless rejected by R.A.M.C. Salary £350 p.a., plus cost-of-living bonus (now £60 p.a., proportion only in cash). Board, lodging, and laundry. Whole-time duties, entirely *medical*, such as Council may require, under supervision of Medical Director. Appointment, subject to medical examination and 1 month's notice, is for 6 months, with possibility of extension to 12 months. Post vacant 8th November, 1945.

Applications, stating age, nationality, qualifications, and experience, enclosing copies of up to 3 recent testimonials, to Medical Director, "B3," of Hospital. Closing date 6th October, 1945.

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

COUNTY COUNCIL OF MIDDLESEX. Napsbury and Shenley MENTAL HOSPITALS. Applications are invited from duly qualified medical practitioners for the established posts of RESIDENT MEDICAL SUPERINTENDENT at each of the above Hospitals, the normal accommodation of each being between 1700 and 2000 Beds. The commencing salary for each post will be £1500 p.a., rising by annual increments of £50 to £1750, and an unfurnished house will be provided rent free (general and water rates being paid by the Council) but there are no other emoluments. The appointments will be subject to the Standing Orders and Staff Regulations of the Council as in force from time to time and to the Asylum Officers' Superannuation Act, 1909. The persons appointed must devote their whole time to the service of the Council, and the duties of each post will include such functions relating to the County Mental Health Service, including responsibility for an Out-patient Clinic at a County General Hospital, as the Council may from time to time determine. All fees received must be paid over to the Council. Candidates must have previous experience in mental hospital work and preference will be given to those holding the D.P.M. qualification. Candidates not already on the permanent staff of the Council should be under 46 years of age on the 1st April, 1946, and will be required to pass a medical examination.

Applications, accompanied by copies of 3 testimonials, should reach the undersigned (envelope to be marked "B3") not later than the 14th January, 1946, and should indicate a date (not being earlier than the 1st April or later than the 1st June, 1946) for commencing duties if appointed. Candidates serving overseas may furnish the names of 3 referees in lieu of forwarding copy testimonials.

An interview of selected applicants will take place about the middle of February, 1946, and candidates should indicate where a telegram or cable will reach them about 3 weeks beforehand.

Candidates must be prepared to accept either position if offered. Canvassing will be a disqualification.

Dated 21st September, 1945.

C. W. RADCLIFFE, Clerk of the County Council.

Guildhall, Westminster, London, S.W.1.

CROYDON GENERAL HOSPITAL, Surrey. (200 Beds.) Applications are invited for the following appointments:—

ASSISTANT RESIDENT SURGICAL OFFICER (B1), wanted at once. Salary £300 p.a. The appointment is for a period of 6 months. This post is recognised for applicants wishing to sit for the Fellowship Examination. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

HOUSE PHYSICIAN. Locum required for 1 month to 6 weeks. Salary £7 7s. per week.

Both the above posts are with residential emoluments.

Applications should be sent to—

GEORGE A. PAINES, House Governor.

MIDDLESEX COUNTY COUNCIL. Junior Assistant Medical OFFICER (B2, resident) required for maternity unit of West Middlesex County Hospital, Isleworth, Middlesex, and annexe at Chiswick. Applications invited from registered medical practitioners, including R practitioners who now hold A posts. Salary £250 p.a., board, lodging, and laundry. Cost-of-living bonus (now £60 p.a., proportion only in cash). Whole-time obstetric duties, such as Council may require, under supervision of Medical Director. Appointment, subject to medical examination and 1 month's notice, is for 6 months, with possibility of extension to 12 months (except R practitioners). Post vacant 16th October, 1945.

Applications, stating age, nationality, qualifications, and experience, enclosing copies of up to 3 recent testimonials, to Medical Director, "B3," of Hospital. Closing date 24th September, 1945. Application forms not provided.

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

MIDDLESEX COUNTY COUNCIL. Temporary Assistant MEDICAL OFFICER (B1, Male) required at Napsbury Mental Hospital, near St. Albans, Herts. Salary £440–£510 p.a., plus war bonus according to qualifications and experience, with board, lodging, laundry, and attendance. In addition £50 p.a. is paid for D.P.M. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications to the Medical Superintendent, "B3."

C. W. RADCLIFFE, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1.

BOROUGH OF ILFORD. Applications are invited from qualified medical practitioners for the appointment of a TEMPORARY ASSISTANT MEDICAL OFFICER OF HEALTH AND RESIDENT MEDICAL OFFICER at the Borough Isolation Hospital and Sanatorium at a salary of £600 p.a., plus a bonus of £24 14s. p.a., with free board and residence at the Council's Isolation Hospital (valued at £100 p.a.), for duties in connexion with the Isolation Hospital and general public health work as required. The consent of the Minister of Health has been obtained to the making of this temporary appointment. The person appointed will be required to work under the direction of the Medical Officer of Health, who is Medical Superintendent of the Hospital. Candidates who are already in whole-time Public Health employment by Local Authorities will not be eligible. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and to the staff regulations of the Council for the time being in force. The selected candidate will be required to pass a medical examination by and to the satisfaction of the Medical Officer of Health. The appointment will also be subject to 1 month's notice on either side.

Applications, stating age, qualifications, and experience, present employment and salary, accompanied by copies of 3 recent testimonials, must be received by me at the Town Hall, Ilford, not later than 27th September, 1945.

Canvassing, directly or indirectly, will be a disqualification.

CHARLES N. ROBERTS, Town Clerk.

Town Hall, Ilford, 5th September, 1945.

ROYAL ALBERT EDWARD INFIRMARY AND DISPENSARY, WIGAN. (189 Beds.) Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), to become vacant 1st November, 1945. Salary is at the rate of £300 p.a. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding Diploma of F.R.C.S. Suitably qualified R practitioners holding B2 appointments are invited to apply. Applications from R practitioners now holding B1 appointments cannot be considered unless they have been rejected by the R.A.M.C.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of three recent testimonials, should be sent to the undersigned as soon as possible.

A. STANLEY BRUNT, General Supt. and Secretary.

ROYAL ALBERT EDWARD INFIRMARY AND DISPENSARY, WIGAN. Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON (B2), Male, vacant 1st October, 1945. Salary £175 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when appointment will be limited to 6 months; otherwise may be extended for a further period.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be sent as soon as possible to—

A. STANLEY BRUNT, General Superintendent and Secretary.

HARROW HOSPITAL. It is desired to appoint an additional E.N.T. SURGEON to the honorary Specialist Staff, to attend fortnightly on a regular appointed day. Candidates must be Fellows of the Royal College of Surgeons and engaged only in consulting practice. The appointment is to be regarded as temporary in accordance with the recommendation contained in B.M.A. letter D.14/1945.

Applications, with duplicate copies of 3 recent testimonials, should be sent as soon as possible to: SYDNEY GARBUTT, Secretary, Harrow Hospital, Roxeth Hill, Harrow, Middlesex.

COUNTY BOROUGH OF BOLTON. Townleys Hospital, Farn-WORTH. Applications are invited from registered Male medical practitioners for the appointment of TEMPORARY ASSISTANT RESIDENT MEDICAL OFFICER (B1). An interest in obstetrics is desirable. The salary will be at the rate of £350 p.a., plus bonus, with emoluments valued at £130 p.a. Suitably qualified R practitioners holding B2 appointments, also those now holding B1 and rejected by the R.A.M.C., may apply.

Application forms, which may be obtained from the Medical Officer of Health, Public Health Department, Civic Centre, Bolton, to be completed and returned, together with copies of 2 recent testimonials, as soon as possible to—

PHILIP S. RENNISON, Town Clerk.

Town Hall, Bolton, 12th September, 1945.

THE GENERAL INFIRMARY AT LEEDS. Applications are invited from registered medical practitioners for the appointment of RESIDENT THORACIC SURGICAL OFFICER (B1), vacant 1st October, 1945. Applicants should have held house appointments and had surgical experience. Salary is at the rate of £120 p.a. The appointment is for 12 months, with eligibility for re-election. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, with copies of 3 recent testimonials, should be received by the undersigned not later than 1st October, 1945.

S. CLAYTON FRYERS, House Governor and Secretary.

THE GENERAL INFIRMARY AT LEEDS. Applications are invited for the post of RESIDENT MEDICAL OFFICER (B1), Male. Commencing salary £200 p.a., with residence, board, and laundry. Candidates must be qualified medical practitioners and registered, and have held a previous resident medical post. The appointment is for 12 months, with eligibility for re-election. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, with copies of 3 recent testimonials, should be received by the undersigned not later than 30th September, 1945.

S. CLAYTON FRYERS, House Governor and Secretary.

THE RADCLIFFE INFIRMARY, Oxford. Applications are invited from registered medical practitioners, Male and Female, including practitioners within 3 months of qualification and liable under the National Service Acts, for the post of GYNÆCOLOGICAL HOUSE SURGEON (A), vacant 31st October, 1945. The appointment will be for 6 months with a salary at the rate of £100 p.a., with full residential emoluments.

Applications, stating qualifications with dates, age, nationality, full christian names and postal address, should be sent not later than Monday, 1st October, 1945, to—

A. G. E. SANCTUARY, Administrator.

CHRISTIE HOSPITAL AND HOLT RADIUM INSTITUTE, WITHINGTON, MANCHESTER, 20. Applications are invited from suitably qualified Genito-Urinary Surgeons, including those at present serving in H.M. Forces, to undertake the work of this Special Department.

Further particulars may be obtained from the General Superintendent, to whom candidates are requested to submit applications (not printed) with the names of 3 referees on or before 31st January, 1946.

SALFORD ROYAL HOSPITAL. Applications are invited for the post of RESIDENT SURGICAL OFFICER (B1). Salary £250, plus the usual residential emoluments. Appointment 1 year. R practitioners holding B2 posts, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications to be made on the prescribed form obtainable from the General Superintendent at the Hospital.

PONTYPOOL AND DISTRICT HOSPITAL, Pontypool, Mon. Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT MEDICAL OFFICER (B2), medical and surgical beds. The salary is at the rate of £250 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise may be extended for a further period.

Applications should be sent to: N. A. BALL, Secretary.

OLDHAM ROYAL INFIRMARY. (203 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of DEPUTY RESIDENT SURGICAL OFFICER (B2), to take charge of the Casualty Department and to work under the Orthopædic Surgeon, vacant 24th September. Salary is at the rate of £200 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise for a period of 12 months.

Applications should be forwarded immediately to—

F. W. BARNETT, General Superintendent and Secretary.

RUGBY—HOSPITAL OF ST. CROSS. Orthopædic Surgeon (Part-time). The Board invites applications for this post from practitioners with orthopædic experience, preferably from those holding the F.R.C.S. or the M.Ch.Orth., to take complete charge of the fracture and general orthopædic work of the Hospital. The successful candidate's first duty will be to the Hospital and to patients in Rugby and district, but private orthopædic practice will be allowed. The successful candidate will be expected to keep up to date by liaison with a university centre, and a secondary part-time hospital appointment would be allowed. The Hospital possesses a model open-air orthopædic ward and Rehabilitation Unit. The salary will be £700 p.a.

Officers serving abroad are invited to apply, and the appointment will not be made for 4 months from the date of this advertisement. Further particulars may be obtained from the Secretary.

HARROGATE AND DISTRICT GENERAL AND E.M.S. HOSPITAL. (330 Beds.) (Recognised by the R.C.S. for final F.R.C.S. examination requirements.) Applications are invited from registered medical practitioners for the appointments of: (1) CASUALTY OFFICER AND HOUSE SURGEON (A) to Special Department (E.N.T. and Eye), combined appointment; (2) HOUSE SURGEON (A) (general surgery), vacant 31st October and 15th October respectively. Salary at the rate of £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointments will be for a period of 6 months.

Applications as soon as possible to the Secretary.

SWANSEA GENERAL AND EYE HOSPITAL. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (B2) to the Ophthalmic and Aural Departments, now vacant. Salary is at the rate of £220 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months.

O. C. HOWELLS, Secretary-Superintendent.

WARWICKSHIRE AND COVENTRY JOINT COMMITTEE FOR TUBERCULOSIS. With the consent of the Ministry of Health, applications are invited from qualified and registered medical practitioners, Men or Women, for the post of TEMPORARY ASSISTANT TUBERCULOSIS OFFICER. Applicants must be ineligible for, or exempt from, service with His Majesty's Forces. The person appointed must be prepared to devote the whole of his or her time to the duties of the office, and must have had experience in the diagnosis and treatment of tuberculosis. The commencing basic salary will be at the rate of £770 p.a., with a further increment of £35 after 1 year's service to a maximum of £805 p.a., plus a cost-of-living bonus (£59 16s. p.a. for a man, and £48 2s. p.a. for a woman), together with motor-car allowances in accordance with the Joint Committee's scale, and other reasonable travelling expenses.

Forms of application and statement of the duties and terms of the appointment can be obtained from the undersigned. Applications, marked "Temporary Assistant Tuberculosis Officer," with copies of not more than 3 recent testimonials, must be received by me not later than first post on Monday, the 8th October, 1945.

L. EDGAR STEPHENS, Clerk of the Joint Committee.

Shire Hall, Warwick, September, 1945.

COUNTY BOROUGH OF WARRINGTON. Warrington General HOSPITAL. (340 Beds.) Applications are invited from registered medical practitioners (Male or Female) for the post of RESIDENT MEDICAL OFFICER (B2). Salary £225 p.a., together with board, residence, and laundry. There are 3 other Medical Officers in residence. The duties are principally in connexion with the maternity section, so that preference will be given to candidates who have held a resident post in a recognised Obstetrical Unit. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise will not exceed 1 year.

Applications, stating age, qualifications, and experience, and date available to commence duties, together with copies of not less than 3 testimonials, to be sent forthwith to—

STUART F. ALLISON, Medical Officer of Health.

Health Department, Sankey-street, Warrington,
September, 1945.

ROYAL BERKSHIRE HOSPITAL, Reading. Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT MEDICAL OFFICER (A) (Blagrave Branch Hospital) and ASSISTANT to the Pathologist (A), (Joint Post), vacant 23rd October. Salary is at the rate of £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, stating age, qualifications with dates, nationality and present post, and accompanied by copies of 3 recent testimonials, should be sent immediately to—

H. E. RYAN, Secretary and House Governor.

WINGFIELD-MORRIS ORTHOPÆDIC HOSPITAL. Resident SURGICAL OFFICER (B1). Commencing salary £350, with board and lodging. Previous experience of orthopædics essential. Post vacant 31st October. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, with names of 2 referees, to be sent to: Professor H. J. SEDDON, Wingfield-Morris Orthopædic Hospital, Headington, Oxford, before 18th October.

ROYAL DEVON AND EXETER HOSPITAL, Exeter. Applications are invited for the post of HONORARY ASSISTANT SURGEON to the Ear, Nose, and Throat Department. Candidates must be Fellows of one of the Royal Colleges of Surgeons or hold the Diploma in Laryngology and Otology of the Royal College of Surgeons of England.

Applications, with certificate of birth and registration and 3 original testimonials, should be delivered to the undersigned on or before the 31st January next. Candidates on Service abroad can send names of 3 persons to whom application may be made for testimonials.

By Order of the Committee. L. PARKHOUSE,
6th September, 1945. Secretary and Manager.

ROYAL UNITED HOSPITAL, Bath. House Physician (A). Applications are invited for the above appointment. Salary at the rate of £150 p.a., with board, residence, &c. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications, with full particulars and copies of 3 testimonials, to be sent at once to—

J. LAWRENCE MEARS, Secretary-Superintendent.

BRADFORD ROYAL INFIRMARY. Applications are invited from registered medical practitioners (Male, single) for the posts of HOUSE SURGEON (B2), vacant 1st October, 1945, and HOUSE PHYSICIAN (A), vacant 17th October, 1945. 6 months' appointments. Salary £150 p.a., with full residential emoluments. There are 372 Beds and 8 Resident Officers. For the B2 post, R practitioners holding A posts may apply; and for the A post, practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications, stating age, nationality, qualifications, and previous experience, with copies of 3 recent testimonials, should be sent immediately to—

H. TRUSSON, House Governor and Secretary.

LEEDS PUBLIC DISPENSARY AND HOSPITAL. Applications are invited from registered medical practitioners for the appointment of HOUSE SURGEON (A), mainly casualty duties. Appointment for 6 months. Salary at the rate of £150 p.a., with board, residence, and laundry. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply.

Applications, stating age, qualifications, and nationality, and accompanied by copies of 3 recent testimonials, to be addressed to: CHARLES F. J. MAURY, Secretary and Superintendent.

VICTORIA HOSPITAL, Accrington. Applications are invited from registered medical practitioners (Male or Female) for the following posts:—

HOUSE PHYSICIAN (A). Appointment will be for a period of 6 months. Salary at the rate of £175 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

HOUSE SURGEON (B2). Appointment will be for a period of 6 months. Salary at the rate of £200 p.a., with full residential emoluments. R practitioners who now hold A posts may apply.

Applications, with copies of recent testimonials, to be sent to: P. D. WADSWORTH, Honorary Secretary.

BRADFORD ROYAL INFIRMARY. Applications are invited from registered medical practitioners (Male, single) for the appointment of HOUSE SURGEON (B2), vacant 1st October, 1945. 6 months' appointment. Salary £150 p.a., with full residential emoluments. There are 372 Beds and 8 resident officers. R practitioners holding A posts may apply.

Applications, stating age, nationality, qualifications, and previous experience, with copies of 3 recent testimonials, should be sent immediately to— H. TRUSSON,

28th August, 1945. House Governor and Secretary.

CITY AND COUNTY OF NEWCASTLE UPON TYNE. Shotley BRIDGE EMERGENCY HOSPITAL. (900 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the post of HOUSE SURGEON (B2) to the Department of Thoracic Surgery. The appointment is tenable for a period of 6 months and salary is at the rate of £250 p.a., plus cost-of-living bonus and full residential emoluments. R practitioners now holding A posts may apply.

Applications to be forwarded immediately to the Medical Officer of Health, Town Hall, Newcastle upon Tyne, 1.

GRIMSBY AND DISTRICT GENERAL HOSPITAL. (237 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT CASUALTY OFFICER AND HOUSE SURGEON (A), now vacant. Appointment is for 6 months. Salary is at the rate of £175 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply.

Applications, stating age, qualifications, nationality, and copies of 3 recent testimonials, to the Superintendent.

YORK COUNTY HOSPITAL. (222 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the appointment of HOUSE SURGEON (A), vacant 22nd September, 1945, whose main duties are in the Eye, Ear, Nose, and Throat Department (37 Beds, with busy Out-patient Clinics), but who will share in the general work of the Hospital; also Casualty Duty. Salary is at the rate of £175 p.a., with full residential emoluments. This post is recognised for D.O.M.S. and D.L.O. examinations. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications to be sent to the undersigned immediately.

J. R. MACKRILL, Secretary.

YORK COUNTY HOSPITAL. (222 Beds.) Applications are invited from registered medical practitioners, Male and Female, for the following appointment:—

ORTHOPÆDIC HOUSE SURGEON AND CASUALTY OFFICER (B2), vacant 27th September, 1945.

The salary is at the rate of £175 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months.

Applications to be sent immediately to—

J. R. MACKRILL, Secretary.

ROYAL WEST OF ENGLAND SANATORIUM AND E.M.S. HOSPITAL, WESTON-SUPER-MARE, SOMERSET. (172 Beds.) Applications are invited from medical practitioners for the appointment of HOUSE PHYSICIAN (A), duties to commence immediately. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply, when the appointment will be for a period of 6 months.

Applications, stating age, qualifications with dates, and nationality, and accompanied by copies of 3 recent testimonials, should be addressed to: LESLIE J. FURSLAND, Secretary.

HUDDERSFIELD ROYAL INFIRMARY. (321 Beds.) Casualty OFFICER (A) required to commence immediately. Salary at the rate of £200, with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be limited to 6 months.

Applications should be sent as soon as possible to—

H. J. JOHNSON, General Superintendent and Secretary.

HUDDERSFIELD ROYAL INFIRMARY. (321 Beds.) Applications are invited for the post of RESIDENT SURGICAL OFFICER (B1). Applicants should have held house appointments and preference will be given to candidates holding diploma of F.R.C.S. Salary at the rate of £350 p.a., with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications should be addressed to—

H. J. JOHNSON, General Superintendent and Secretary.

WORCESTER ROYAL INFIRMARY. Applications are invited for the position of HOUSE SURGEON (A). The salary will be at the rate of £120 a year, with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for 6 months.

Applications, with copies of not more than 3 testimonials, should be addressed to—

HAROLD WIGG, Acting Superintendent-Secretary.

COUNTY BOROUGH OF SOUTHEND-ON-SEA. Applications are invited from registered medical practitioners of either sex, including R practitioners who now hold A posts, for the appointment at the Southend Municipal Hospital, Rochford, Essex, of RESIDENT ASSISTANT MEDICAL OFFICER (B2), duties mainly obstetrics and anæsthetics. The salary is at the rate of £325 p.a., with full residential emoluments, plus war bonus. The person appointed will be liable to pay superannuation contributions if the provisions of the Local Government Officers' Superannuation Acts are applicable. The appointment will be limited to 6 months for R practitioners; otherwise 1 year and subject to 1 month's notice on either side. This post becomes vacant on the 1st November, 1945.

Application forms, obtainable from the Medical Superintendent, Southend Municipal Hospital, Rochford, Essex, should be returned to him as soon as possible.

D. G. FINCHAM, Deputy Town Clerk.

Town Clerk's Office, Southend-on-Sea, 10th September, 1945.

KINGSTON UPON HULL CORPORATION HEALTH DEPART-MENT. ANLABY ROAD HOSPITAL. (581 Beds.) Applications are invited for the appointment of TEMPORARY ASSISTANT MEDICAL OFFICER (B1) from registered medical practitioners of either sex. Salary £350 p.a., rising by annual increments of £25 to £450 p.a., plus war bonus, together with an allowance at the rate of £150 p.a. in lieu of board, residence, and laundry outside the Hospital. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Forms of application, &c., may be obtained from, and should be returned duly completed to, the Medical Officer of Health, Guildhall, Kingston upon Hull, at the earliest possible moment.

LANCASHIRE COUNTY COUNCIL. Public Health Committee. ABBOTSFIELD HOSPITAL, FLIXTON, MANCHESTER. Applications are invited from registered medical practitioners (Male or Female) for the appointment of ASSISTANT MEDICAL OFFICER (B2). Salary is at the rate of £300 p.a., together with an allowance of £150 p.a. in lieu of residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise may be renewed for a further period of 6 months.

Forms of application may be obtained from the County Medical Officer of Health, Hospital and Medical Department, County Offices, Preston, to whom all applications must be forwarded not later than Monday, the 1st October, 1945.

R. H. ADCOCK, Clerk of the County Council.

County Offices, Preston, 12th September, 1945.

COUNTY BOROUGH OF HALIFAX. Isolation Hospital. (100 Beds.) Applications are invited from registered medical practitioners for the temporary appointment of RESIDENT MEDICAL OFFICER (B1) at a commencing salary of £350 p.a., rising by annual increments of £25 to a maximum of £450, together with the usual residential allowances valued at £150 p.a. and a temporary cost-of-living bonus of £29 18s. Candidates should be over military age or otherwise exempt from service with the Forces. The appointment is subject to the provisions of the Local Government Superannuation Act. The appointment will also be subject to 1 month's notice on either side. Suitably qualified R practitioners holding B2 posts, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, stating age, qualifications, experience, and present employment, accompanied by copies of not more than 3 recent testimonials, must be received not later than Friday, 12th October, 1945, by: G. C. F. ROE, Medical Officer of Health.

Public Health Department, Powell-street, Halifax,

September, 1945.

HARLOW WOOD ORTHOPÆDIC HOSPITAL, near Mansfield, NOTTS. (355 Beds, E.M.S. and Civilian, including Rehabilitation Unit.) Regional Orthopædic Centre and Peripheral Nerve Injury Unit. Applications are invited from registered medical practitioners, including R practitioners who now hold A posts, for the appointment of RESIDENT HOUSE SURGEON (B2). Appointment will be for a period of 6 months at the rate of £200 p.a., with full residential emoluments.

Applications to the Secretary.

ROYAL WEST SUSSEX HOSPITAL, Chichester. (274 Beds— 160 E.M.S.) Applications are invited for post of RESIDENT SURGICAL OFFICER (B1), vacant in October. Salary £450 p.a., with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply. The appointment is limited to 6 months.

Applications, stating age, qualifications, nationality, and details of experience, accompanied by 3 testimonials, should be addressed to: K. H. WILLIAMS, Secretary.

DISTRICT INFIRMARY, Ashton-under-Lyne. (Normally 200 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the appointment of CASUALTY OFFICER AND ORTHOPÆDIC HOUSE SURGEON (B2). Salary at the rate of £200 a year, with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months.

Applications, with full details of experience, nationality, &c., should be forwarded at once to—

FRANK OLIVER, General Superintendent and Secretary.

CITY OF LEICESTER. City General Hospital, Gwendolen-road. Applications are invited from registered medical practitioners for the appointment of RESIDENT HOUSE SURGEON (A). Duties: obstetrical, gynæcological, and surgical. Salary is at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months; otherwise will not exceed 1 year.

Applications (on forms supplied) must be submitted as soon as possible, endorsed "House Surgeon, City General Hospital" and addressed to—

E. K. MACDONALD, Medical Officer of Health.

City Health Department, Grey Friars, Leicester.

THE CHILDREN'S HOSPITAL (King Edward VII Memorial), BIRMINGHAM, 16. Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), to commence duties not later than 1st December, 1945. Applicants should have held house appointments and had surgical experience. Preference will be given to candidates holding the diploma of F.R.C.S. The salary will be at the rate of £350 p.a., with the usual residential emoluments. Suitably qualified R practitioners holding B2 posts, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, stating age, nationality, qualifications with dates, and particulars of previous appointments, should be sent by 27th October, 1945, to— ARNOLD TUNSTALL,
5th September, 1945. House Governor.

HULL ROYAL INFIRMARY. Applications are invited for the following posts:—

ORTHOPÆDIC HOUSE SURGEON (B2), vacant now. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months.

CASUALTY OFFICER (A), vacant October. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Salary for each of the above posts £200 p.a., with full residential emoluments.

Applications to: R. J. CARLESS, House Governor.

BIRMINGHAM UNITED HOSPITAL. The General Hospital, THE QUEEN ELIZABETH HOSPITAL. (Also incorporating the QUEEN'S HOSPITAL 1840–1941.) Applications are invited from registered medical practitioners, Male or Female, including R practitioners who now hold A posts, for the appointment of RESIDENT ANÆSTHETIST (B2) at the General Hospital. The appointment is for 6 months and is a recognised Resident Anæsthetist post for the purpose of taking the Diploma in Anæsthetics. Candidates from the Forces will be specially considered. Salary £100 to £120 p.a., according to experience, with full residential emoluments.

Applications, stating age, qualifications, experience, nationality, and present post, together with copies of 3 recent testimonials, should be sent at once to—

G. HURFORD, Secretary, Birmingham United Hospital.
The Queen Elizabeth Hospital, Birmingham, 15.

HARLOW WOOD ORTHOPÆDIC HOSPITAL, near Mansfield, NOTTS. (405 Beds, E.M.S. and Civilian, including Rehabilitation Unit.) Regional Orthopædic Centre and Peripheral Nerve Injury Unit. Applications are invited for the post of RESIDENT SURGICAL OFFICER (B1). Salary £250 p.a. The appointment is for a period of 6 months. Suitably qualified R practitioners holding B2 posts, also those now holding B1 and rejected by the R.A.M.C., may apply.

Applications, stating age and accompanied by copies of not more than 3 recent testimonials, to be sent as soon as possible to: D. ROBERTS, Secretary-Superintendent.

ROYAL LANCASTER INFIRMARY, Lancaster. (311 Beds.) (Hospital recognised by the Royal College of Surgeons (England) for 2 Senior Posts.) Applications are invited from registered medical practitioners, Male and Female, for the post of JUNIOR HOUSE SURGEON (A), vacant 18th October. The salary is at the rate of £170 p.a., with full residential emoluments. The appointment will be limited to 6 months. Practitioners within 3 months of qualification and liable under the National Service Acts may apply.

Applications, with testimonials, should be sent to—
C. H. GRIMSHAW, Superintendent-Secretary.

LINCOLN COUNTY HOSPITAL. (Voluntary Hospital—200 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the following appointments:—

HOUSE PHYSICIAN (A), vacant end of October, 1945.
HOUSE SURGEON (A), vacant middle October, 1945.

Salary in each case is at the rate of £225 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply, when the appointments will be for 6 months.

ARTHUR MOORE, Secretary-Superintendent.
5th September, 1945.

ROYAL WEST SUSSEX HOSPITAL, Chichester. (302 Beds— 200 E.M.S.) Applications are invited from registered practitioners for the appointment of CASUALTY OFFICER AND HOUSE SURGEON (A). Salary £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply, when the appointment is limited to 6 months.

Applications, stating age, qualifications, and nationality, and details of experience, accompanied by 3 testimonials, should be sent to: K. H. WILLIAMS, House Governor and Secretary.

ROYAL CORNWALL INFIRMARY, Truro. (330 Beds—5 Resi-dential.) Applications are invited from registered practitioners (Male or Female) for the following appointments:—

HOUSE SURGEON (B2) to the General Surgical and Gynæcological Departments, vacant on or about 25th October, 1945.
ORTHOPÆDIC AND CASUALTY HOUSE SURGEON (B2), vacant on or about 11th October, 1945.

Salary is at the rate of £200 p.a., with full residential emoluments for each post. R practitioners holding A posts may also apply, when appointments are limited to 6 months.

Applications should be addressed to the Secretary.
1st September, 1945.

CUMBERLAND INFIRMARY, Carlisle. Applications are invited from registered medical practitioners, including practitioners within 3 months of qualification and liable under the National Service Acts, for the post of HOUSE SURGEON (A), vacant from 1st October next. The appointment will be for a period of 6 months. Salary is at the rate of £160 p.a., with board, &c.

Applications should be sent to the Secretary-Superintendent immediately.

Carlisle, 3rd September, 1945.

CAMBORNE-REDRUTH MINERS' AND GENERAL HOSPITAL, REDRUTH, CORNWALL. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 19th October, 1945. Salary at the rate of £200 p.a., with the usual residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications, together with copies of 3 testimonials, to be addressed to: J. C. FIELD, Secretary-Superintendent.

Redruth, August, 1945.

CAMBORNE-REDRUTH MINERS' AND GENERAL HOSPITAL, REDRUTH. With the formation of a special department, a vacancy occurs for a PHYSICIAN for Diseases of Children. A higher qualification, preferably Membership of the Royal College of Physicians, is essential. Experience in pediatrics would be an additional advantage. Candidates must be prepared to engage solely in consulting practice in this sphere.

Full particulars may be obtained from the undersigned. Applications from Service candidates are specially invited. It is not proposed to make an appointment before December, 1945, in order that serving practitioners may receive full consideration. J. C. FIELD, Secretary-Superintendent.

CHELMSFORD AND ESSEX HOSPITAL, London-road, Chelms-FORD, ESSEX. (180 Beds.) Applications are invited for the post of HOUSE PHYSICIAN (A), Male or Female, to commence 1st October. Salary £175 p.a., plus board, lodging, and laundry. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for 6 months.

Apply, with recent testimonials, to—
R. G. MORRISH, House Governor and Secretary.

CHELMSFORD AND ESSEX HOSPITAL, London-road, Chelms-FORD, ESSEX. (186 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the post of HOUSE SURGEON (A), to commence immediately. Salary £175 p.a., plus board, lodging, and laundry. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for 6 months.

Apply, with recent testimonials, to—
R. G. MORRISH, House Governor and Secretary.

NORTHUMBERLAND COUNTY COUNCIL. Hexham Emer-GENCY HOSPITAL. (Regional Orthopædic Centre—640 Beds.) Applications are invited from registered medical practitioners, Male or Female, for the post of HOUSE SURGEON (A). Salary is at the rate of £120 p.a., with full residential emoluments. The Hospital offers excellent training and experience in orthopædic surgery. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months; otherwise 1 year.

Applications, stating age, nationality, qualifications, and accompanied by 2 recent testimonials, should be sent immediately to: J. B. TILLEY, County Medical Officer.

County Hall, Newcastle upon Tyne, 1.

NOTTINGHAM AND MIDLAND EYE INFIRMARY. Applica-tions are invited from registered medical practitioners (Male and Female) for the appointment of HOUSE SURGEON (B1). Applicants should have had some surgical ophthalmic experience. Salary £300 p.a., with full residential emoluments. Post recognised for D.O.M.S. examination. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications should be sent forthwith to—
T. RUSSELL MOORE, Secretary.

THE BOLTON ROYAL INFIRMARY. (270 Beds—Resident Medical Staff, 6.) Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A), vacant 21st October, 1945. Salary £175 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, stating age, nationality, and experience, together with copies of testimonials, to be forwarded to—
JOSEPH GRIFFITH, Superintendent-Secretary.

PONTEFRACT GENERAL INFIRMARY AND THE HYDES HOSPITAL. (112 Beds.) Applications are invited from registered medical practitioners (Male) for the appointment of HOUSE SURGEON (A), vacant immediately. Salary £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months.

Applications should be sent to—
August, 1945. D. J. RICHARDS, Secretary-Superintendent.

COUNTY BOROUGH OF IPSWICH. Borough General Hospital. Applications are invited from registered medical practitioners, Male and Female, for the appointment of RESIDENT ASSISTANT MEDICAL OFFICER (B1). Applicants should have held house appointments and had surgical experience. Salary at the rate of £350 p.a., plus full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications to the Medical Officer of Health, Public Health Department, Elm-street, Ipswich.

ROYAL SOUTH HANTS AND SOUTHAMPTON HOSPITAL, SOUTHAMPTON. (253 Beds.) Applications are invited from registered medical practitioners, Male and Female, including practitioners within 3 months of qualification and liable under the National Service Acts, for the appointment of CASUALTY OFFICER AND HOUSE SURGEON (A) to the E.N.T. Department. The appointment will be for a period of 6 months. Salary is at the rate of £175 p.a., with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of 3 recent testimonials, should be sent immediately to—
FRANK JENNINGS, House Governor and Secretary.

ROYAL SOUTH HANTS AND SOUTHAMPTON HOSPITAL. (255 Beds.) Applications are invited from registered medical practitioners, Male and Female, including R practitioners who now hold A posts, for the appointment of HOUSE PHYSICIAN (B2). The appointment will be for a period of 6 months. The salary is at the rate of £175 p.a., with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and present post, and accompanied by copies of 3 recent testimonials, should be sent immediately to—

FRANK JENNINGS, House Governor and Secretary.

NORTHAMPTON GENERAL HOSPITAL. (405 Beds.) Applications are invited immediately from registered medical practitioners, Male or Female, for the following appointments:—

HOUSE PHYSICIAN (A), and HOUSE SURGEON (A). Salary at the rate of £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointments will be for a period of 6 months.

OBSTETRICAL AND GYNÆCOLOGICAL HOUSE SURGEON (B2). Salary at rate of £150 p.a., with full residential emoluments. R practitioners holding A posts may apply, when appointment will be limited to 6 months.

Applications should be sent as soon as possible to—

GORDON S. STURTRIDGE.

INGHAM INFIRMARY AND SOUTH SHIELDS AND WESTOE DISPENSARY. Applications are invited from medical practitioners (Male or Female), including practitioners within 3 months of qualification and liable under the National Service Acts, for the post of HOUSE SURGEON (A). The appointment will be for a period of 6 months. Salary at the rate of £175 p.a., with full residential emoluments.

Applications, stating age, qualifications with dates, nationality, and accompanied by copies of 3 recent testimonials, to be sent immediately to: HENRY F. PITT, House Governor and Secretary.

Secretary's Office, Ingham Infirmary, South Shields.

BURTON-ON-TRENT GENERAL INFIRMARY. (200 Beds, Normal.) Applications are invited from registered medical practitioners for the appointment of CASUALTY OFFICER AND HOUSE SURGEON (A). Salary at the rate of £200, with the usual residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, stating qualifications, age, and nationality, and accompanied by copies of 3 testimonials, to be sent to the Secretary-Superintendent.

COUNTY BOROUGH OF SOUTHEND-ON-SEA. Southend MUNICIPAL HOSPITAL, ROCHFORD, ESSEX. Applications are invited from registered medical practitioners, Male or Female, for the appointment of RESIDENT HOUSE MEDICAL OFFICER (A), vacant 1st November, 1945. Salary is at the rate of £200 p.a., with full residential emoluments, valued at £100 p.a., plus cost-of-living bonus. The person appointed will be liable to pay superannuation contributions if the provisions of the Local Government Officers' Superannuation Acts are applicable. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be tenable for a period of 6 months; otherwise 1 year.

Forms of application can be obtained from the Medical Superintendent, Southend Municipal Hospital, Rochford, Essex.

H. J. WORWOOD, Town Clerk.

Town Clerk's Office, Southend-on-Sea.

NOTTINGHAM GENERAL HOSPITAL. (712 Beds, including E.M.S. Beds.) Applications are invited from registered medical practitioners (Male and Female) for the appointment of RESIDENT CASUALTY OFFICER (A) for the above Hospital. Duties to commence immediately. Salary at the rate of £200 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months.

Applications, stating age, qualifications, and experience, together with copies of testimonials, to be sent to—

HENRY M. STANLEY, House Governor and Secretary.

THE STAFFORDSHIRE GENERAL INFIRMARY, Stafford. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (A). Salary £196 p.a., with board-residence. Practitioners within 3 months of qualification and liable under the National Service Acts may also apply, when appointment will be for 6 months.

Applications, with full particulars as to age and qualifications, accompanied by 3 recent testimonials, to be forwarded to—

Stafford, August, 1945. A. E. COLLINS, Secretary.

CLAYTON HOSPITAL, Wakefield. Applications are invited immediately from registered medical practitioners for the appointment of RESIDENT ORTHOPÆDIC OFFICER with Casualty duties (B2), Male. Salary £200 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when appointment will be limited to 6 months; otherwise may be extended for a further period.

Applications should be sent as soon as possible to—

W. READ, Superintendent and Secretary.

ROYAL HALIFAX INFIRMARY. (Class Ia, E.M.S.) (250 Beds.) Applications are invited for the post of RESIDENT SURGICAL OFFICER (B1), Male. Salary £250 p.a., with residence, board, and laundry. Preference given to one holding the F.R.C.S. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, stating age, previous experience, and nationality, together with testimonials, should be sent immediately to—

30th July, 1945. A. MIDGLEY, Secretary.

CITY OF BIRMINGHAM. Dudley Road Hospital. Applications are invited from registered medical practitioners, Male and Female, for the post of JUNIOR MEDICAL OFFICER (A) in the Maternity Block at Dudley Road Hospital. The salary will be between £200 and £300 p.a., according to experience, plus residential emoluments. The Maternity Block has some 125 antenatal and obstetric beds and there are some 50 gynæcological beds in the Hospital. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be for a period of 6 months; otherwise not exceeding 12 months.

Applications, stating age, qualifications, experience, and nationality, and accompanied by copies of 3 recent testimonials, should be addressed to the Medical Officer of Health, Public Health Department, Birmingham, 3, to reach him not later than the 1st October, 1945.

CITY OF BIRMINGHAM. Dudley Road Hospital (an Acute General Hospital with 1100 Beds). Applications are invited from registered medical practitioners, Male or Female, for appointment as JUNIOR MEDICAL OFFICER (A) at the above Hospital. The salary is at the rate of £200 p.a., plus residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for 6 months; otherwise for 1 year.

Applications, stating age, qualifications, nationality, and experience, and accompanied by copies of 3 recent testimonials, should be sent to the Medical Officer of Health, Public Health Department, Birmingham, 3, to reach him not later than the 1st October, 1945.

CITY OF BIRMINGHAM. Selly Oak Hospital (an Acute General Hospital of some 520 Beds with an Infirmary of 650 Beds attached). Applications are invited from registered medical practitioners, Male or Female, for appointment as JUNIOR MEDICAL OFFICER (A) at the above Hospital. The salary is at the rate of £200 p.a., plus residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for 6 months; otherwise for 1 year.

Applications, stating age, qualifications, nationality, and experience, and accompanied by copies of 3 recent testimonials, should be sent to the Medical Officer of Health, Public Health Department, Birmingham, 3, to reach him not later than the 1st October, 1945.

LANCASHIRE COUNTY COUNCIL. Applications are invited for the following posts:—

WRIGHTINGTON HOSPITAL, near WIGAN.

JUNIOR MEDICAL OFFICER (B2) at this Hospital, containing 370 Beds (260 Beds for non-pulmonary tuberculosis (adults and children), 20 Beds for "combined" pulmonary and non-pulmonary cases, and 70 Beds for pulmonary cases). The medical staff consists of Medical Superintendent, Deputy and 2 Medical Officers, 2 Consultant Orthopædic Surgeons, other visiting surgeons and visiting physician. Good facilities for reading for M.D.

HIGH CARLEY SANATORIUM, near ULVERSTON.

JUNIOR MEDICAL OFFICER (B2) at this Sanatorium, containing 130 Beds for adult pulmonary patients and (at Oubas House) 21 Beds for pulmonary cases in children. The medical staff consists of Medical Superintendent, Deputy and Medical Officer.

The salary for each post is £300 p.a., plus bonus, together with board, single quarters, and laundry, valued at £146. R practitioners who now hold A posts may apply, when appointments will be limited to 6 months; otherwise 1 year.

Forms of application and conditions of appointment from Central Tuberculosis Officer, County Offices, Preston.

KINGSTON UPON HULL CORPORATION HEALTH DEPARTMENT. Applications, with the consent of the Minister of Health, are invited for the temporary post of Whole-time ASSISTANT MEDICAL OFFICER OF HEALTH (Woman) for Maternity and Child Welfare from duly qualified medical Women who are not already in whole-time public health employment. Candidates must have had experience in children's diseases and in midwifery. The Diploma in Public Health, or its equivalent, will be considered an additional qualification for the office. Salary £600 p.a., rising by annual increments of £25 to £700 p.a., plus war bonus.

Application forms, &c., may be obtained from, and should be returned to, the Medical Officer of Health, Guildhall, Kingston upon Hull, at the earliest possible moment.

CITY OF LEICESTER. Isolation Hospital and Sanatorium. (412 Beds.) Applications are invited from registered medical practitioners for the appointment of RESIDENT MEDICAL OFFICER (B1) at the above Hospital, vacant 8th October. Salary is at the rate of £350 to £450 by £25 p.a., with the usual residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, on forms to be supplied, accompanied by copies of 3 recent testimonials, to be sent immediately to—

E. K. MACDONALD, Medical Officer of Health.

Health Department, Grey Friars, Leicester.

COUNTY OF DENBIGH. Wrexham Emergency Hospital. (350 Beds, excluding Annexes.) Applications are invited from registered medical practitioners for the appointment of HOUSE PHYSICIAN (A). Salary is at the rate of £200 p.a., plus cost-of-living bonus, together with the usual residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when the appointment will be for a period of 6 months; otherwise a period not exceeding 1 year.

Applications and copies of recent testimonials to be sent immediately to: Dr. H. ARWEL THOMAS, County Medical Officer of Health, 40, Well-street, Ruthin, Denbighshire.

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CITY OF LEEDS. Public Health Department. St. Mary's Infirmary. Applications are invited from registered medical practitioners, Male, for the post of RESIDENT MEDICAL OFFICER (B2) for the above Hospital. Preference will be given to candidates who have held an A post in a maternity hospital. The salary is at the rate of £250 p.a., plus a cost-of-living bonus, together with full residential emoluments. The Hospital comprises a maternity unit of 98 Beds and 102 Beds for chronic sick. It is a Part I Training School under the regulations of the C.M.B. and the duties of the officer will include instruction of pupil midwives. All fees received by the officer must be paid into the City funds. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise 12 months.

Applications, stating age, qualifications, and experience, together with copies of 3 recent testimonials and endorsed "R.M.O.," to be forwarded to—

J. JOHNSTONE JERVIS, Medical Officer of Health.
Public Health Department (Hospitals Administration Section), 12, Market Buildings, Leeds, 1.

EAST RIDING COUNTY COUNCIL. Beverley Emergency Hospital. Applications are invited from registered medical practitioners, Male and Female, for the appointment of HOUSE SURGEON (B2) (general duties), vacant 1st November, 1945. The salary is at the rate of £200 p.a., with full residential emoluments. R practitioners who now hold A posts may apply, when the appointment will be limited to 6 months; otherwise 1 year, subject to 1 month's notice on either side.

Applications to be made as soon as possible to—

T. STEPHENSON, Clerk of the Council.

County Hall, Beverley, 15th September, 1945.

EAST RIDING COUNTY COUNCIL. Driffield Emergency Hospital. (324 Beds.) Applications are invited from registered medical practitioners for the appointment of RESIDENT SURGICAL OFFICER (B1), vacant immediately. The Hospital provides experience in general surgery. Salary from £350 to £550 p.a., according to qualifications and experience, together with full residential emoluments. Suitably qualified R practitioners holding B2 appointments, also those holding B1 and rejected by the R.A.M.C., may apply.

Applications, stating age, qualifications, and previous experience, should be forwarded so as to reach the undersigned as soon as possible. T. STEPHENSON, Clerk of the Council.

County Hall, Beverley, 15th September, 1945.

MANCHESTER ROYAL INFIRMARY. The Board of Management invite applications from registered medical practitioners, Male and Female, for the post of SENIOR HOUSE SURGEON (B2) to Orthopædic Department, now vacant. The appointment is for 6 months at a salary of £150 p.a., with residence. R practitioners holding A posts may apply.

Applications, stating age, nationality, qualifications, together with testimonials, to be sent to the Chairman of the Medical Board. By Order, F. J. CABLE,
General Superintendent and Secretary.

14th September, 1945.

COUNTY BOROUGH OF BURNLEY. Applications are invited from medical practitioners, either sex, for the temporary position of ASSISTANT MEDICAL OFFICER OF HEALTH. Persons already in whole-time public health employment by local authorities will not be eligible to apply. The duties will be mainly in connexion with the School Medical Service but will include maternity and infectious diseases. Salary £500 p.a., rising by £25 p.a. to a maximum of £700 p.a., plus bonus of at present £59 16s.

Conditions of appointment and forms of application may be obtained from the Medical Officer of Health, St. James's-street, Burnley, to whom applications must be returned as soon as possible. ARCHIBALD GLEN, Town Clerk.

Town Hall, Burnley, 14th September, 1945.

THE VICTORIA INFIRMARY OF GLASGOW. (503 Beds.) The Governors invite applications for the appointment of a Whole-time RADIOLOGIST. Salary according to experience but not less than £1000 p.a. Further particulars may be obtained from the Medical Superintendent at the Infirmary. It will be necessary for the successful candidate to join the Infirmary's Superannuation Fund if eligible.

Applications, together with the names of 2 persons to whom reference may be made, to be sent to the undersigned. In order to allow members of the Services stationed overseas time to apply, the date for receiving applications has been extended until 22nd January, 1945.

JOHN W. ROBSON, Secretary and Treasurer.
40, St. Vincent-place, Glasgow, 7th September, 1945.

UNIVERSITY OF BIRMINGHAM. Faculty of Medicine. Department of Physiology. Applications are invited for the posts of (1) LECTURER IN PHYSIOLOGY at a salary of not less than £500 p.a., (2) TEMPORARY ASSISTANT LECTURER IN PHYSIOLOGY at a salary of not less than £350 p.a.

Applications, stating age, qualifications, and experience, and giving the names of 3 persons to whom reference may be made, should be sent not later than 30th November, 1945, for the Temporary Assistant Lecturer's post, and the 22nd January, 1946, for the Lecturer's appointment, to the undersigned, from whom further particulars may be obtained. Testimonials are not required. C. G. BURTON, Secretary.

The University, Edmund-street, Birmingham, 3,
September, 1945.

SOUTHEND GENERAL HOSPITAL. Applications are invited from registered practitioners for the post of RESIDENT ANÆSTHETIST (B2). Salary will be at the rate of £200 p.a., with full residential emoluments. This post is recognised for the Diploma in Anæsthetics. The post is now vacant. R practitioners holding A posts may also apply, when the appointment will be limited to 6 months.

Applications, stating age, qualifications, and experience, together with copies of 2 recent testimonials, to be sent immediately to: E. A. CAMP, Acting Assistant Secretary.

SOUTHEND GENERAL HOSPITAL. House Surgeon (A) required to commence duties on 1st November. This post is recognised by the Royal College of Surgeons. Salary at the rate of £150 p.a., with full residential emoluments. Practitioners within 3 months of qualification and liable under the National Service Acts may apply, when appointment will be limited to 6 months.

Applications to be sent as soon as possible, stating age, qualifications, and experience, together with copies of 2 recent testimonials, to: E. A. CAMP, Acting Assistant Secretary.

MINISTRY OF PENSIONS HOSPITAL, Childwall, Liverpool. Applications are invited from registered medical practitioners for the appointment of SENIOR PHYSICIAN at the above-mentioned Ministry of Pensions Hospital. Salary £700 p.a., with Civil Service war bonus and free board and lodging or an allowance of £100 p.a. in lieu thereof if permission is given to live out. Preference will be given to applicants who hold a higher medical qualification, and in this connexion suitably qualified R practitioners holding B1 posts who have been rejected by the R.A.M.C. are invited to apply.

Applications, stating age, qualifications with dates, and nationality, accompanied by copies of 2 recent testimonials, should be addressed to the Secretary, Ministry of Pensions, Medical Services Division, Norcross, Blackpool, Lancs.

MUNICIPAL COUNCIL OF NAIROBI (KENYA COLONY). The Municipal Council of Nairobi invites applications from qualified and experienced persons for the post of ASSISTANT LADY MEDICAL OFFICER. Candidates must possess a knowledge of child welfare and maternity. The salary attached to the post is £600 p.a., rising by annual increments of £30 to £840–£40–£920, with efficiency bar at £840. After a probationary period of 6 months, the person appointed, if confirmed in the appointment, will be required to contribute 7½% of her salary to the Municipal Provident Fund, into which the Council will contribute a similar amount. The person appointed will be entitled to 6 months' overseas leave on full pay with passage paid after each period of 4 years' service. 18 days' annual local leave is also granted.

Applications, stating age, experience, and qualifications, and accompanied by a recent photograph, medical certificate, and certified copies (not originals) of testimonials, should be addressed to: W. W. RIDOUT, Town Clerk.

Town Hall, Nairobi, Kenya Colony, 31st August, 1945.

Applications are invited from registered medical practitioners, age 30 to 40 years, for the post of ASSISTANT MEDICAL DIRECTOR at THE EVANS BIOLOGICAL INSTITUTE, RUNCORN, CHESHIRE. Candidates should have a sound knowledge of modern scientific medicine, and be interested in the development and manufacture of biological and chemotherapeutic products. Salary £1200 to £2000 p.a., according to qualifications, age, and experience.

Applications, together with testimonials, should be sent to the Medical Director before 31st January, 1946.

Receptionists, linguists and non-linguists, part and full-time workers. All members ex-censorship personnel, fully qualified and competent to undertake work of confidential nature.—Apply to the Secretary, THE POST-WAR EMPLOYMENT ASSOCIATION (licensed annually by the L.C.C.), 27, Lincoln's Inn-fields, W.C.2. Tel.: HOLborn 5522 (Ext. 3).

Doctors, Male and Female, required for Locums and Assistantships. Vacancies for Hospital Locums and Ships' Surgeons. Practices and Partnerships for disposal.—Write: A. SHAW, Medical Transfer Agent, Premier Buildings, 88, Church-street, Liverpool.

Efficient Scotswoman desires position Secretary-Housekeeper, London, where daughter (19) could assist.—Box P.1670, SCRIPPS'S, South Molton-street, W.1.

MSS. promptly and accurately typed. Medical work a specialty. 2s. 6d. 1000 words, carbons 3d.—Miss G. BICKFORD, 48, West Kensington-court, W.14.

South Wales—urgently required to Sell old-established Practice, owner wishing to specialise. Bargain.—Address, No. 714, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

For Sale, the late Dr. F. C. Abbott's well-known Nursing Home, situated at Whitehill, Bletchingley, Surrey. Specially built for the purpose and comprising The Hermitage and Red Gables, small home farm, 3 cottages, garages, &c., and woodland area—in all about 30 acres. Recently de-requisitioned.—Further particulars from: Messrs. PECKOVER, BURRILL & OWEN, Denbigh, N. Wales, and Messrs. DANIEL SMITH, OAKLEY & GARRARD, 32, St. James's-street, London, S.W.1 (WHItehall 9385/6).

Residential Private Nursing Home, Southport. Taking £1500 p.a., with full equipment and modern theatre. 14 rooms (12 fully furnished). Well staffed, modern heating and airing arrangements, separate billiard-room, garage for 3 cars, large kitchen garden and greenhouse. Valuable modern property. Inclusive price £8000.—Apply: STIRLINGS (LIVERPOOL) LTD., 41, North John-street, Liverpool. CENtral 0775.

Death Vacancy. Country Practice in the Home Counties in delightful district, including Georgian house and garden in excellent repair. Inclusive price £7200.—Address, No. 708, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Electrotherapy, Massage, &c. (Manchester). Owner retiring, opportunity for young Practitioner. Price, including Equipment, House (with garage), £2500. Mortgage arranged. Also Nursing Homes for Sale from £1500.—Write: NATIONAL ASSOCIATION OF NURSING HOMES (Sales Section), 15, Castle-street, Exeter.

Radium: You can hire up to 100 mgms. of radium element made up to any required specification, for the moderate fee of £5 5s. from: J. C. GILBERT, LTD., Columbia House, Aldwych, W.C.2. Tel.: Chancery 6060.

Medical Photographs and Drawings for illustrations, records, &c. —Write for particulars: E. O. SONNTAG, 159, Bickenhall Mansions, Baker-street, W.1. WELbeck 8860.

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